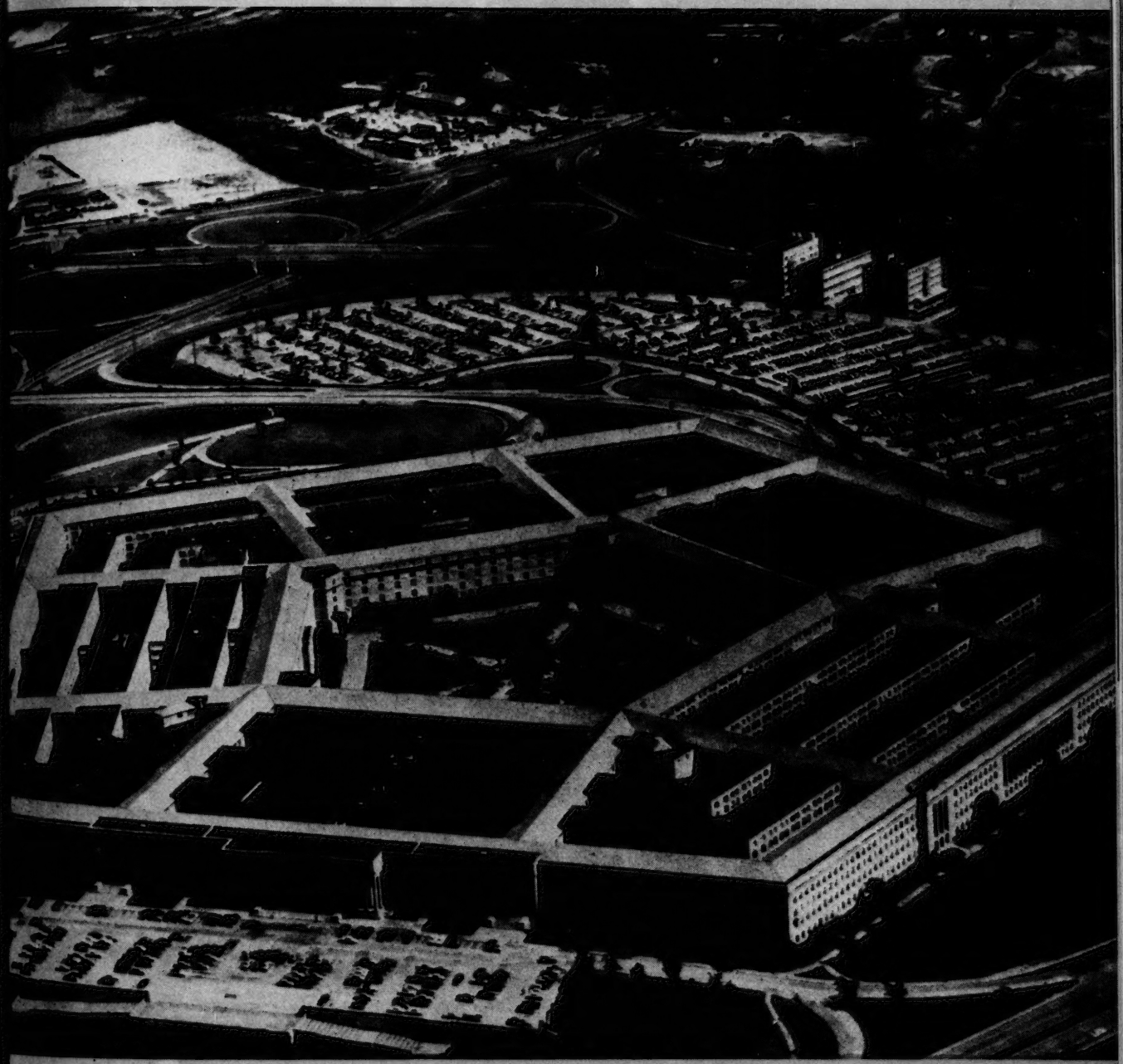
AIR CONDITIONING HEATING AND VENTILATING

MAY, 1957—54th Year

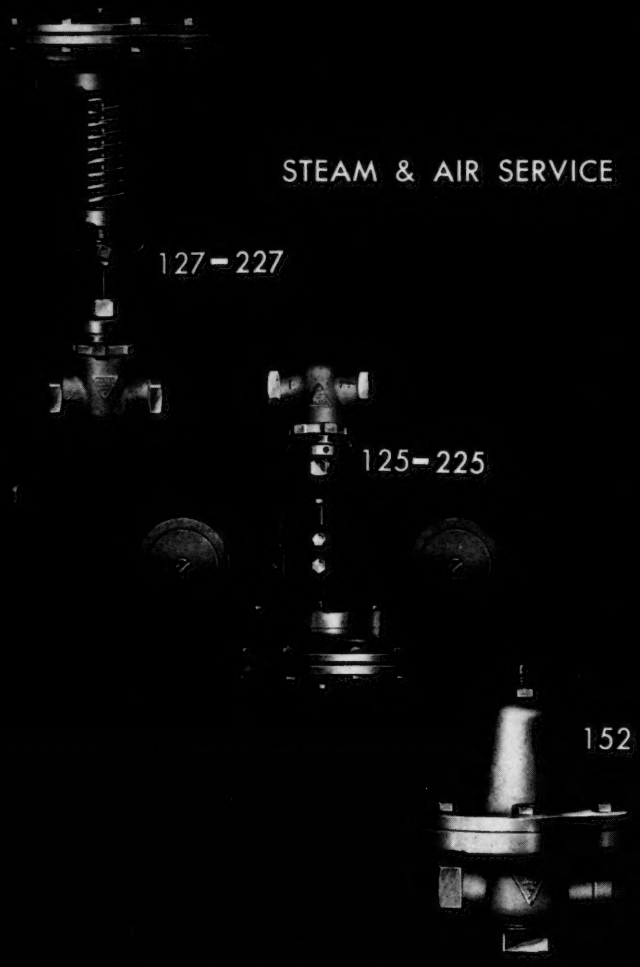


View of The Pentagon, headquarters of USA Armed Forces

Featuring A 16-page Special Report on the Government-Industry Symposium on Air-Conditioning — of significance because the Federal Government, through its military and civilian branches, is the largest single buyer of air conditioning. Report begins on page 85.

REGULATORS

...dustrial, Institutional application...



WATTS Nos. 127 and 125 Single Seated Pressure Regulators, Sizes ½" to 4". Initial pressures up to 250 lbs.

No. 127 spring type — Reduced pressure range 10 to 100 lbs.

No. 125 weight and lever type — Reduced pressure range 1 to 15 lbs.

Furnished in bronze body construction with screwed ends up through 3" size. Sizes 2½", 3" and 4" may be furnished with standard or extra heavy flanged ends. Standard bronze trim or special metal alloy trim can be furnished.

WATTS Nos. 227 and 225 Double Seated Pressure Regulators, Sizes ½" to 6". Sizes up to 2" are available with screwed or union ends. 2½" to 6" have standard or extra heavy flanged ends.

WATTS No. 152 Self-Contained Single Seated Pressure Regulator, Sizes ½", ¾", 1".

Furnished in iron body construction with bronze trim for initial pressures up to 150 lbs. Reduced pressure ranges 5-40, 25-100 lbs. Furnished in bronze body construction for initial pressures up to 250 lbs. and reduced pressures up to 200 lbs.

For complete information

Send for . . .

Steam Catalog Folder F-127A.

WATTS No. 135 Self-Contained Reducing Valve, Sizes ½" to 2". All bronze unit incorporating integral strainer.

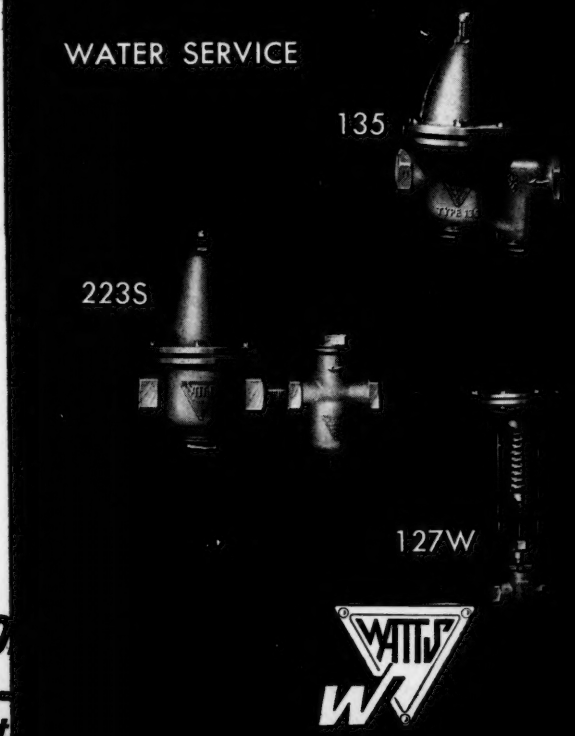
WATTS No. 223 High Capacity Self-Contained Reducing Valve, Sizes ½" to 2". All bronze construction. Also available with separate strainer. When furnished with separate strainer, specify No. 223S.

WATTS No. 127W Remote Control Diaphragm Spring Type Pressure Reducing Valve. Sizes ½" to 3".

These valves have wide industrial applications where water reducing valves must reach full capacity with minor drop in reduced pressure. Initial pressures up to 250 lbs. Reduced pressure ranges available from 10 lbs. to 100 lbs.

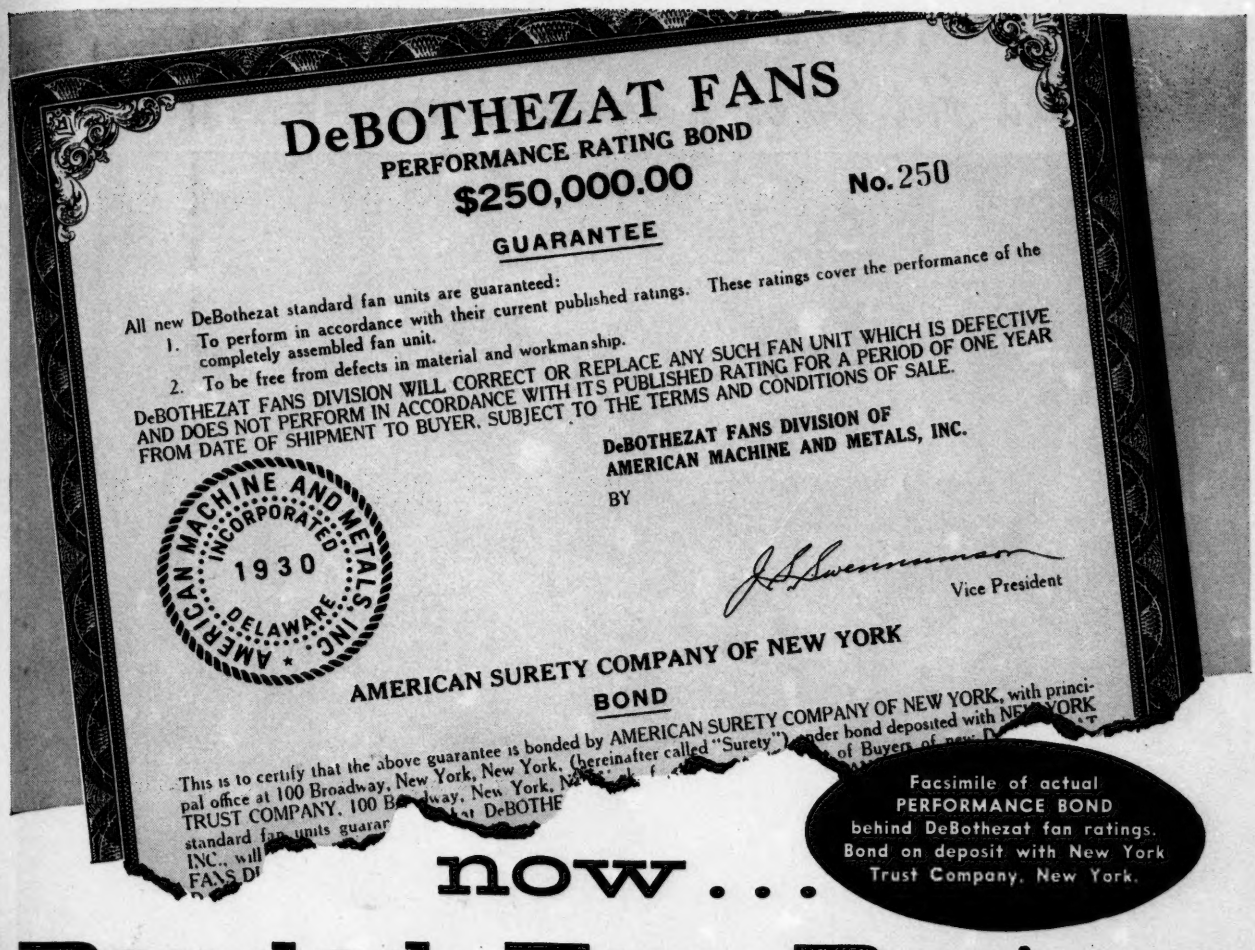
Send for . . .

Folder F-135A with complete product details and specifications.



WATTS *Regulator Co*

Lawrence, Massachuset


DeBOTHEZAT FANS
PERFORMANCE RATING BOND
$250,000.00
No. 250
GUARANTEE
All new DeBothezat standard fan units are guaranteed:
1. To perform in accordance with their current published ratings. These ratings cover the performance of the completely assembled fan unit.
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DeBOTHEZAT FANS DIVISION WILL CORRECT OR REPLACE ANY SUCH FAN UNIT WHICH IS DEFECTIVE AND DOES NOT PERFORM IN ACCORDANCE WITH ITS PUBLISHED RATING FOR A PERIOD OF ONE YEAR FROM DATE OF SHIPMENT TO BUYER, SUBJECT TO THE TERMS AND CONDITIONS OF SALE.
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BY
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AMERICAN MACHINE AND METALS INCORPORATED 1930 DELAWARE INC.
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This is to certify that the above guarantee is bonded by AMERICAN SURETY COMPANY OF NEW YORK, with principal office at 100 Broadway, New York, New York, (hereinafter called "Surety") under bond deposited with NEW YORK TRUST COMPANY, 100 Broadway, New York, New York,
standard fan units guaran
INC., will
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Facsimile of actual PERFORMANCE BOND behind DeBothezat fan ratings. Bond on deposit with New York Trust Company, New York.

now . . . Bonded Fan Ratings

You can depend upon all DeBothezat fan ratings because they are *bonded*. When you select a DeBothezat fan by its published rating, do so with confidence. No guesswork — no allowance to be on the safe side.

All DeBothezat fan performance ratings are *bonded* by the American Surety Company and this bond is on deposit with New York Trust Company, New York.

This is your positive assurance that a DeBothezat rating is what the *complete* fan unit actually puts out.

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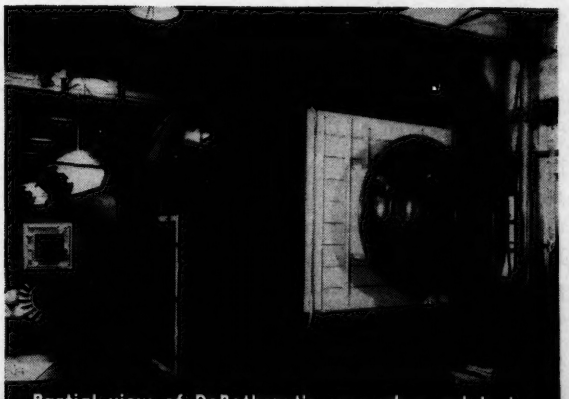

Partial view of DeBothezat's own advanced testing facilities. Accurate wind tunnel tests are made here in accordance with the appropriate NAFM plate . . . conform to U. S. Dept. of Commerce Standard 178-51.

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A DIVISION OF

American Machine and Metals, Inc.

EAST MOLINE, ILLINOIS

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WEBSTER TRU-PERIMETER

Forced Hot Water BASEBOARD HEATING

. . . all-new for 1957 . . . *proved and improved!*

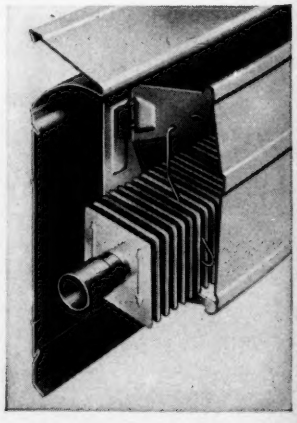
Now Webster Baseboard Heating is better than ever . . . and at a new, lower price!

Ten years ago Webster pioneered in the baseboard heating field with the world's first Tru-Perimeter Heating. Today . . . with those basic principles unchanged . . . Webster presents a new non-ferrous Baseboard Heating that teams its time-tested, performance-proved features with a new improved design and construction.

Here's 1957's smoothest highway to home heating comfort! Here's all the beauty of earlier Webster Baseboard, plus new production economies for lower first cost . . . and easier, more economical installation. And for summer comfort, include the completely independent — completely compatible — Webster Cool Air System, with ducts designed for cooling only. Separate controls for heating and cooling.

For your next residential installation, start your planning with Webster's Finest Product — the Warren Webster Man. Call him . . . or write for Baseboard Bulletin C-680, or Cool Air Bulletin B-2011.

Warren Webster & Company, Camden 5, N. J. Since 1888. Offices in 67 principal U. S. cities and Canada.



In Webster Baseboard Heating, air enters at floor line, passes over heating element, is warmed and comes out at top of baseboard enclosure. Baseboard extends only 2⅞ inches beyond plaster line.

Webster's Finest Product . . . the Warren Webster Man

WARREN WEBSTER

HEATING . . . COOLING

AIR CONDITIONING HEATING AND VENTILATING

MAY, 1957

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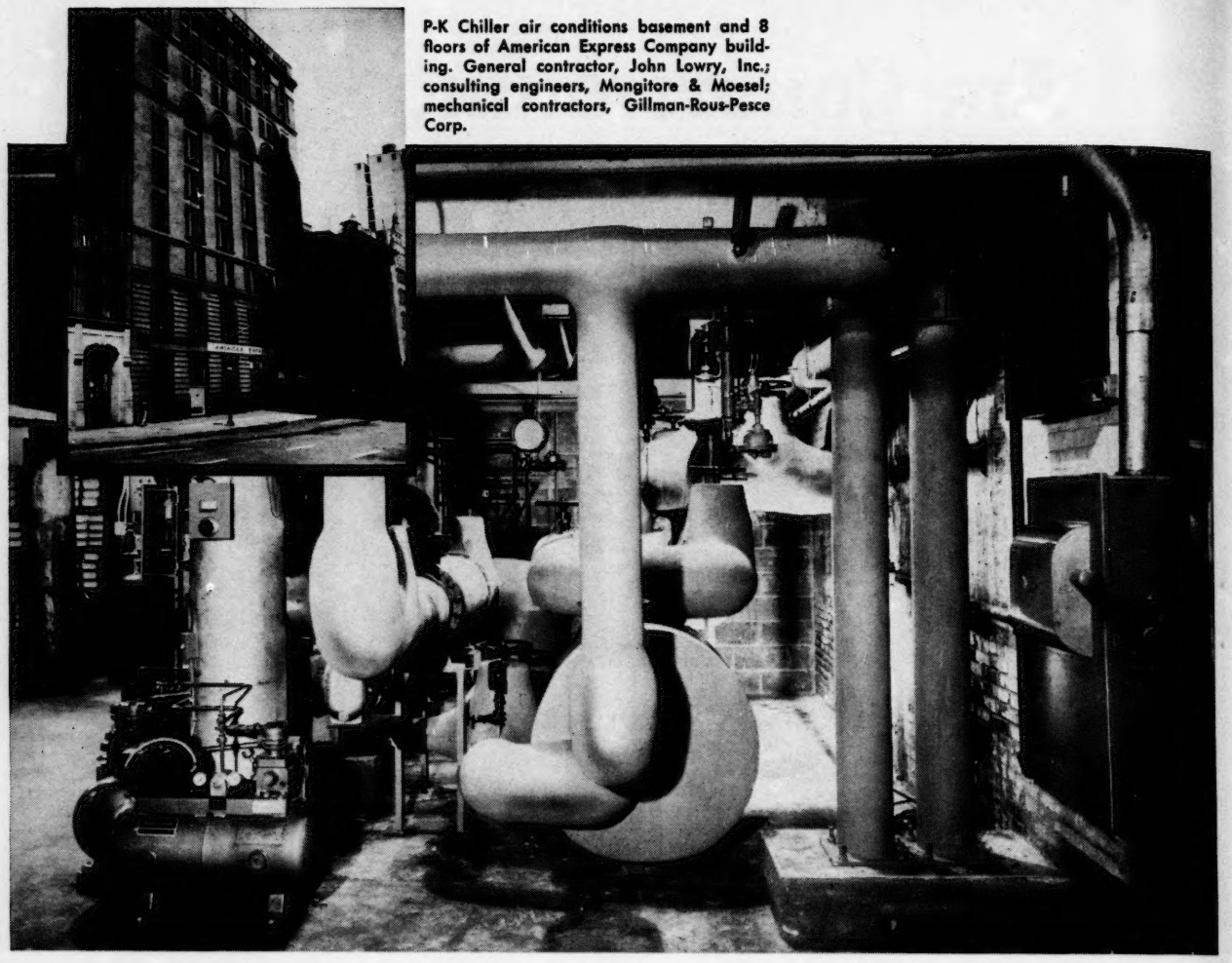


P-K Chiller air conditions basement and 8 floors of American Express Company building. General contractor, John Lowry, Inc.; consulting engineers, Mongitore & Moesel; mechanical contractors, Gillman-Rous-Pesce Corp.

P-K Chiller uses piped-in brine to air condition American Express

American Express Company processes money orders and travelers cheques from all over the world in a downtown Manhattan building, erected in 1858. Years ago, pipes were laid underground from a refrigerating plant, three blocks away, serving cold storage warehouses. Today, these same 6" mains feed primary brine, at about 0°F, to a P-K Chiller for an air conditioning system.

In this unusual air conditioning installation, the P-K Chiller cools secondary brine to 38°F, at a maximum load of 300 tons. It serves the basement and 8 floors of the building, and can be expanded to serve two floors now used for storage files.

The P-K Chiller's use of piped-in brine saved $100,000 in refrigerating plant equipment, occupies only 15' x 20' of space. Operating and maintenance costs are low. American Express also uses a P-K heat exchanger to temper the air supply for the building during the winter.

The efficiency of P-K Chillers was a major factor in P-K's selection for this installation. But P-K has the engineering answers to any air conditioning or heat transfer problem you may have. For complete information about P-K Chillers, write today for Catalog 101. The Patterson-Kelley Co., Inc., 950 Burson Street, East Stroudsburg, Pa.

Patterson Kelley
Chemical and Process Division

3870

Flooded and Dry Expansion Type Freon Coolers and Storage Water Coolers • Freon Condensers • Allied Refrigeration and Air Conditioning Equipment

HIGH SPOTS

• **Radiant Heating & Cooling Institute** came into being in Los Angeles, Calif., during April. An organization of California contractors, its newly elected officers are George Rusher of Rusherheat, president; Harry Taylor of Harry Taylor Plumbing & Heating, vice-president; Leroy C. Bishop of Year-Round Comfort Institute, secretary; and Donald S. Smith of Piping Engineers, treasurer. Codes and standards will be drawn up. Literature and engineering information will be distributed to architects, contractors, engineers, and homeowners. Advent of radiant cooling systems will accelerate installations of radiant year-round systems in large commercial, residential, and public buildings, the Institute states.

• Preliminary figures compiled on the first 120 of 172 **test houses** entered in a national low cost comfort program to determine average heating and air conditioning costs indicate **savings of 25%** for dwellings engineered for comfort conditioning as opposed to those that are built to meet only FHA minimum property requirements. Program, sponsored by **Owens-Corning Fiberglas Corp.,** Toledo, Ohio, seeks data to verify the belief of the company and others that an average residence of 1200 sq ft can be heated and air conditioned for an average of $10 per month by use of proper insulation, shading, attic ventilation, and orientation.

• Papers to be presented on June 4th during the 35th annual convention in Boston of **Oil-Heat Institute of America, Inc.,** New York, N.Y., include: Heating Oil Quality, by R. P. Gilmartin, Gulf Oil Co.; The Handling and Use of Domestic Heating Oil, by E. W. Cole, Texas Co.; Oil-Fired Air Conditioning, by R. W. Sage, Esso Research & Engineering Co.; Weathertrix, by D. H. Bottrill, OHI technical secretary; Pulsation in Oil-Fired Equipment, by Abbott Putnam, Battelle Memorial Institute; Field Testing of Improved Home Heating Equipment, by R. L. Weeks, Esso Research & Engineering Co.; and Technical Side of Good Burner Servicing, by T. R. Loizeaux Jr., T. R. Loizeaux Fuel Co.

• **Elliott Co.,** Jeannette, Pa., will soon be a division of **Carrier Corp.,** Syracuse, N.Y., following a formal merger agreement and a vote of the stockholders. Carrier has been a substantial user of Elliott's products which include steam turbines, heat transfer equipment, gas turbines, and centrifugal compressors and expanders.

• **The Fluid Control Institute, Inc.,** will hold its **Spring meeting** at the Greenbrier, White Sulphur Springs, W. Va., on May 9-10. The meeting will be presided over by the president, John C. Koch of Conoflow Corp., Philadelphia, Pa., and the vice-president, Dean E. Madden of A. W. Cash Valve Mfg. Corp., Decatur, Ill. Formed in 1921, the organization used to be known as the National Steam Specialty Club. Its membership consists of individuals from prominent manufacturers of automatic regulating, control, and solenoid valves, space heating specialties, steam and gas traps, and steam heating pumps.

• Nearly **three out of every four business offices in New York City are air conditioned,** a recent survey of the Office Executives Association of New York reveals. Based on a representative 293 companies within the association, the survey shows 201 completely air conditioned, with an additional 16 partly air conditioned. Only 76 reporting companies were without air conditioning. Of these, almost 60% were taking steps toward the purchase and installation of units, 24% actually installing units this year, or during 1958.

WASHINGTON OVERTONES

by LORING OVERMAN

● When Congress took its Easter recess, overtones from several of its actions or proposals promised to echo loudly in the air-conditioning industry.

● House budget-cutters, for instance, has voted to **halve Commerce Departments' request for funds to run BDSA**—Business and Defense Services Administration. Such action, if sustained by Senate, would eliminate 25 Industrial Divisions within BDSA. Included would be those speaking for air-conditioning, heating and ventilating industries in matters involving scarce materials needed for either defense or civilian production.

● With funds denied, there would be an end to such BDSA projects as April's **government-industry symposium** on air-conditioning. Arranged by BDSA's General Industrial Equipment Division, the symposium attracted several hundred government-industry people seeking:

● to pool information needed to obtain maximum benefits for manpower and money expended for air conditioning:

● to "recognize air-conditioning as a modern necessity";

● to develop a better understanding of what air conditioning can accomplish for government, industry and domestic users; and

● to lay the groundwork for government-industry cooperation on present and future problems.

● Obviously, the public relations overtones of such government-sponsored projects on behalf on air-conditioning are of **tremendous value to the industry.** But whether they and scores of others similarly important to those involved are properly chargeable to tax-payers is another matter.

● National Association of Manufacturers and U.S. Chamber of Commerce, both swinging the economy axe, concede that some will be hurt by tax cuts. Air-conditioning is not to escape.

● In spotlighting "possible ways to cut the $71.2 billion federal budget for fiscal 1958", NAM sleuths point out scores of items as subjects for reduction or elimination. Among them:

● "Repair and improvement of 4,500 federal buildings . . . is going up from $42,600,000 in 1957 to a requested $85,500,000 in 1958," says *NAM News'* reprint of a semi-kidding budget analysis from Chicago *Daily News.*

● "The big jump will enable thousands of federal workers to keep a cool head on the job. Included in the total figure is $41,850,000 to pay for the first full year of a seven-year air conditioning program. **Cost of the entire program will be $328,000,000."**

● "Only $963,358 was spent (by government) for air conditioning in 1956. It sky-rocketed to $18,138,200 in 1957."

● Foregoing is typical of the dilemma faced by Members of Congress as voters clamor for tax cuts; as those affected by budget cuts press for exceptions.

● Meanwhile industry leaders reported at the BDSA symposium that **1957 should be a record year** for room air-conditioners and central systems for residences. Room unit goal is 2,000,000 units—up 20 percent from 1956. Central systems for residences are expected to rise by 25 percent over last year—to 250,000.

● Although preoccupied with problems of inducing Congress to grant funds for its many programs, the **Housing and Home Finance Agency has promised to revise its ideas** regarding financing of air-conditioning equipment in FHA-financed homes.

● The agency now has under consideration a file of data provided by an industry task committee working under direction of the Air-Conditioning and Refrigeration

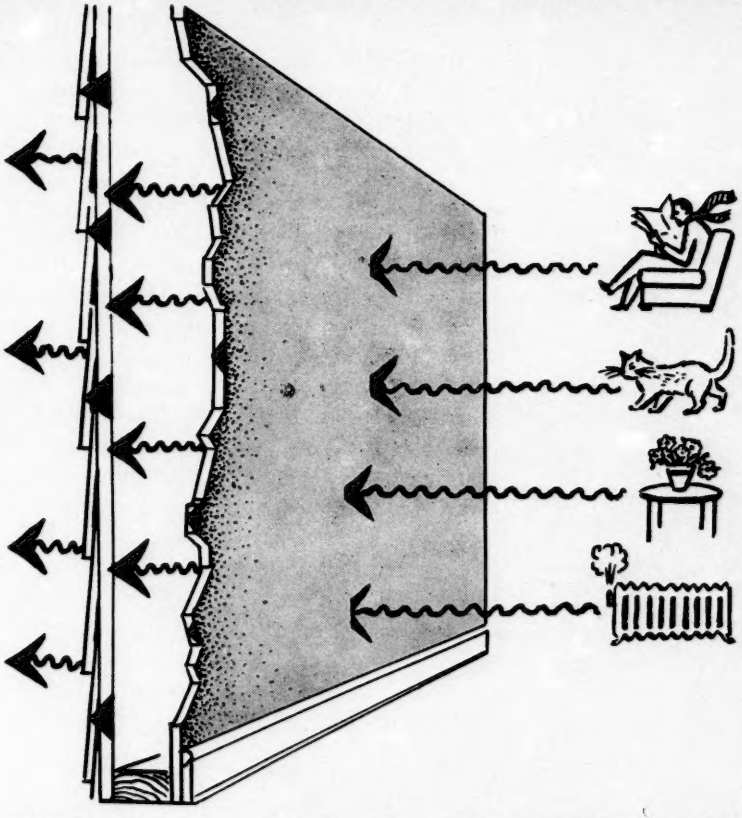
(Concluded on page 8)

Ever Feel a "Draft" in a Warm, Closed Room?

(RADIATION is the transmission through space of invisible heat rays. They have no temperature, only energy. When absorbed by a surface, their energy is transformed to HEAT. The surface of any object warmer than absolute zero—the Sun, You, Clothing, Wood, Plaster, an Iceberg, a Stove, a Chair, Paper, an Animal, will RADIATE to a colder surface.)

(CONDUCTION is the process by which a cooler object or particle is heated by direct physical CONTACT with a warmer one.)

(CONVECTION is the transfer of heat within air caused by the flow of the air itself.)



People often complain of "drafts" in a room with air-tight walls and windows. Why? To a large extent because, by Nature's law, warmth flows to cold by RADIATION as well as by CONDUCTION. Cold walls, too, draw heat out of contacting air by conduction, causing a downward current of cold air.

The exposed skin of people and the outer surfaces of their clothing lose heat as infra red heat rays flow from them with 90% emissivity to a cooler wall surface which has 93% absorptivity (and transforms the heat rays again to heat). If insulation is lacking, or has settled down, most of this heat is transmitted by radiation to the colder outer wall with 93% emissivity, absorbed, and then dissipated to the colder, outer air. So people are uncomfortable, perhaps only in spots. More fuel is then burned.

Multiple layers of aluminum in the wall space would retard convection; turn back heat rays with 97% reflectivity. When plaster is sufficiently warm, no net heat loss radiates from bodies to it; no current of cold air flows along the wall's surface. Comfort is maintained without unduly high temperatures or fuel costs.

In summer, the process is identical except for direction. Heat flow by radiation, conduction and convection is retarded by the multiple sheets of aluminum in the outer wall space. Interiors of rooms stay cooler, and the plaster surfaces are also often cooler than the body. Some heat would then *leave* the body for the colder wall surfaces, increasing body coolness and comfort.

You'll enjoy, as well as profit from reading Alexander Schwartz's recently published manual: "Heat Flow by Radiation in Buildings, Simplified Physics." The scientific background of heat flow, specific information on how to control it, data on the various types of multiple aluminum insulation, ratings of insulation performance, and installation techniques under many conditions are interestingly discussed in this liberally illustrated 48 page manual. A FREE copy is yours for the asking.

THERMAL VALUES
Infra Type 4 Parallel Insulation

Up-Heat C .105*=3⅛" non-metallic insulation†
Wall-Heat C .068*=4¾" non-metallic insulation†
Down-Heat C .042*=7⅞" non-metallic insulation†

*Determined by method of National Bureau of Standards in H.H.F.A. Research Paper 32.
†Calculated on basis of limiting thermal values cited in Fed. Specs. LLL-f-321b; HH-I-585; HH-I-521c; HH-I-551a.

Cost installed between wood joists, material and labor, about 8¢ sq. ft.

Type 6 also available

Can be purchased everywhere through your preferred local dealer.

Infra Insulation Inc., 525 Bway., N.Y.C., Dpt. V-5
Please send "Heat Flow by Radiation."

NAME

FIRM

ADDRESS

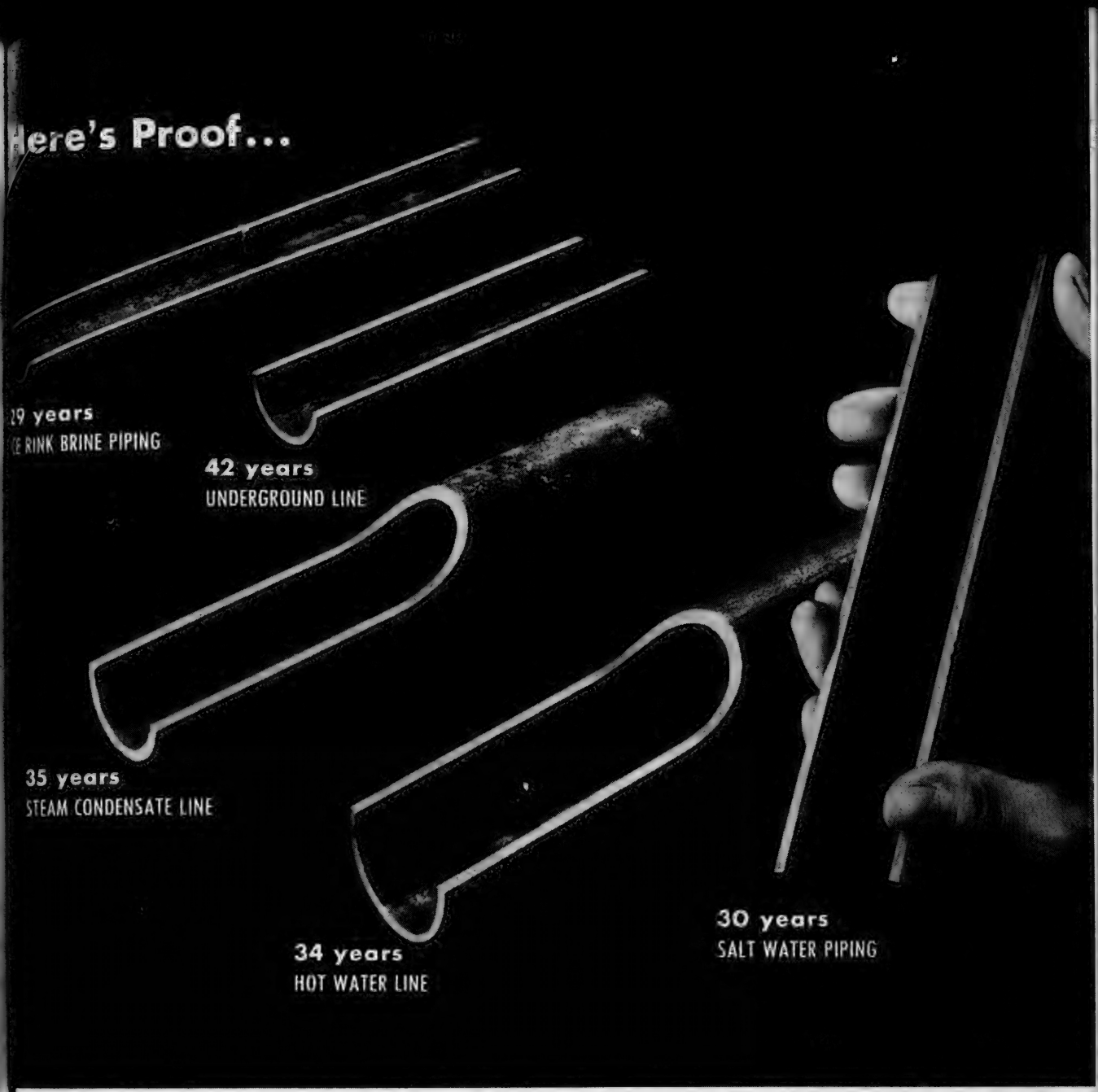
WASHINGTON OVERTONES *(Concluded from page 6)*

Institute. Following a meeting with FHA officials, task committee members said:
- "We're not very far apart. We're much closer than we were a year ago."
- Builders and equipment manufacturers have held that FHA appraisals have not reflected full value of air conditioning systems.

- A **Presidential veto awaits the new housing bill** if it passes House and Senate in the form approved by the Housing Banking Committee. Considered most objectionable by the Administration is a proposal to use up to one billion dollars of National Service Life Insurance funds for direct purchase of veterans' mortgage loans. Other provisions:
- provide $250 additional for direct purchase of veterans' mortgages in areas where private credit is not available at reasonable rates;
- authorize Government to absorb one-half of one percent charged for FHA insurance premiums. This would establish venterans' total interest rates at 5 percent, leaving the non-veteran rate at 5½ percent;
- provide $250 million for slum clearance and urban rehabilitation.
- provide $300 million to purchase military housing mortgages.
- Controversial aid-to-school-construction legislation was rapidly approved by the House Education and Labor Subcommittee. Bill would authorize **direct federal aid to construction of up to $400 million** in each of four years; $750 million for federal purchase of school district bonds when no local market for such securities exists; $150 million for government servicing and guarantees on state school bonds.
- Bill contained no segregation provision.

- **Although housing starts dropped during March** to an 8-year low of 83,000 units, the overall construction picture boosted the first quarter total to a new record.
- Seasonally adjusted, expenditures for new construction during the 1957 first quarter were at the annual rate of $44.8 billion. Total for the preceding quarter was at the annual rate of $44.4 billion; actual expenditures for 1956, $44.3 billion.
- Forecast for the year is that total will be somewhat below the $46.4 billion figure initially estimated. Situation could change if Congress gets a bone in its teeth on new housing and school construction.

- Small business was receiving the red carpet treatment during April:
- Senator Thye (R-Minn.) with Senators Potter (R-Mich.), Capehart (R-Mich.), and Bush (R-Conn.) as co-sponsors, introduced a bill (S1789) to make the Small Business Administration a permanent agency. Senator Sparkman (D-Ala.) sponsored a similar bill.
- Congressman Curtis (R-Mo.) and Senator Curtis (R-Mich.) have introduced companion bills to provide an initial program of **tax relief for small business.** Despite earlier predictions that no tax reductions could be voted at this session of Congress, the possibility that the Potter-Curtis legislation might "make it" is being discussed.
- The legislation would give tax relief to individual proprietorships, partnerships, self-employed persons as well as to corporations. Other provisions:
- would permit business firms to deduct from taxable income a sum equal to their investment in depreciable assets or inventory during the year—such deductions not to exceed 20 percent of net income or $30,000, whichever is lower;
- would allow taxpayer to set aside earnings in anticipation of this estate tax, and pay any balance over a 10-year period.
- Needled by voters, members of Congress are conceding that **it might be possible to trim taxes,** possibly starting in 1958. Reflecting the new viewpoint of some Congressman, Rep. Richard Simpson (R-Pa.), introduced a bill to cut federal income taxes by some five billion dollars. Best way to reduce federal spending, he reasoned, is to reduce federal income.



Over 250,000 fibers of glasslike iron silicate guard each cross-sectional square inch of wrought iron pipe against corrosion

Wrought Iron Pipe pays off in years of service rendered

There's a practical, dependable way to evaluate a piping material's potential in corrosive service: check its performance under actual field conditions.

The photo above shows how wrought iron pipe measures up when this service-life yardstick is applied. Here you see actual samples taken from wrought iron pipe installations in a variety of corrosive services. Some of these sections came from buildings that were being torn down. Some were cut from in-use installations by our laboratory staff.

The reasons why wrought iron pipe has lasted so long and remained in such excellent condition are found in the material's structure and composition. Tiny fibers of glasslike iron silicate are threaded throughout the body of high-purity iron. These non-rusting fibers are highly resistant to corrosive attack. When corrosion strikes, these fibers halt and detour the attack, prevent rapid pitting and penetration.

Our bulletin, *Piping for Permanence*, presents in detail wrought iron pipe's case against corrosion. Write for a copy.

A. M. Byers Company, Pittsburgh, Pa. Established 1864. Division Offices in Boston, New York, Philadelphia, Washington, Atlanta, Pittsburgh, Chicago, St. Louis, Houston, San Francisco. International Division: New York, N.Y.

Available in Canada and throughout the world

BYERS Wrought Iron Tubular and Hot Rolled Products

ALSO ELECTRIC FURNACE QUALITY STEEL PRODUCTS

BRIEFLY STATED

• **Paul R. Hoffmann** of Lilie-Hoffmann Cooling Towers, Inc., St. Louis, Mo., has been elected president of the Cooling Tower Institute. Mr. Hoffmann is president of his company and has served on the board of directors of the Institute since 1950. He succeeds **James P. Wiseman** of the Fluor Products Co., Whittier, Calif.

• **H. C. McDaniel** has been named director of technical information for the Westinghouse Electric Corporation. At the same time, **Robert V. McGahey** was appointed manager of technical publicity for the company.

• The Deming Company, Salem, Ohio, announced the appointment of **Glenn L. Davis** as chief engineer. The firm also announced promotion of **Eugene T. Brooks** to assistant chief engineer and **Louis C. Ospeck** to chief design engineer.

• **Hyter C. Hall, Jr.** has been appointed district sales manager for Iron Fireman Manufacturing Co., Cleveland, Ohio. He will direct sales of the company's heating equipment in the Philadelphia, Washington and Baltimore areas.

• On April 1, W. H. & L. D. Betz, Philadelphia, Pa., changed from the partnership form to the corporate form. At the same time the company name was changed from W. H. & L. D. Betz to **Betz Laboratories, Inc.**

• Distribution throughout Florida for Buensod-Stacey, Inc., dual-duct air conditioning equipment was announced with the appointment of **H. L. McMurry & Company** as sales representatives.

• **Merle W. McLaughlin** has been appointed vice-president in charge of manufacturing of Copeland Refrigeration Corp., Sidney, Ohio.

• **Alan S. Decker** was elected vice president of engineering, and **Frank T. Carney,** vice president of purchasing for Dunham-Bush, Inc., West Hartford, Conn. In their new capacities Mr. Decker and Mr. Carney will be the overall coordinators of engineering and purchasing, respectively, for the entire corporation, its divisions and subsidiaries.

• Seelye Stevenson Value & Knecht announces appointment of the following engineers as associates of the firm: In the Civil Engineering Div., **William D. Bailey;** in the Structural Engineering Div., **Frohman P. Davis, Ira M. Hooper, Frederick J. Kircher, Philip P. Page,** and **Wayman C. Wing;** in the Mechanical and Electrical Engineering Div., **William T. Cleland, Jack N. Keck,** and **Alexander Michelson, Jr.**

• For the second year in succession the **Day & Night Mfg. Co.** has opened the year with a series of advanced air conditioning engineering schools to be held throughout the entire country for interested dealer personnel. Present reservations call for the team of sales engineers to hold schools in more than 25 cities to estimated audiences of over 350 dealers.

• **Combustion Engineering, Inc.,** announces it has entered into an agreement with **L. O. Koven & Brother, Inc.,** Jersey City, N. J., whereby Koven is taking over the manufacture and sale of the entire line of domestic water heaters and tanks previously manufactured and sold by Combustion. This line includes both gas and electric types of automatic water heaters sold under the trade names Heatmaster and Perfection.

• **W. F. Jonas & Co.** of Antioch, Ill., has been appointed manufacturer's representative for Woodside Engineering Co., producers of baseboard air distribution equipment.

• **Frank E. Dameron** has been appointed assistant directing engineer of Crane Company's heating and air conditioning engineering department, Chicago, Ill. Mr. Dameron joined Crane as a draftsman in that department in 1937.

• The retirement of **John S. O'Gorman, Jr.** as manager of the Detroit branch has been announced by Johnson Service Co., Milwaukee. Mr. O'Gorman has been with the organization since 1931. He is a member of the board of directors and will continue to serve in that capacity.

• **John B. West,** district development engineer, Aluminum Company of America's Atlanta district sales office, has been elected a director of National Association of Corrosion Engineers. He took office March 15, the final day of this year's NACE conference in St. Louis, Mo.

• Election of **Georg Stabenow** as vice president in charge of engineering has been announced by International Boiler Works Co., East Stroudsburg, Pa. A graduate of Ilmenau University in Germany, Mr. Stabenow joined the staff as chief engineer in 1945.

• **Edward Gerstenschlager** has been appointed manager of production engineering of The Babcock & Wilcox Company's Boiler Division. His headquarters will be at the company's Barberton, Ohio, works.

• The **William R. Funk Company** has been appointed exclusive sales representative in the Philadelphia area for Binks cooling towers, the **Binks Mfg. Co.,** Chicago, Ill., announced.

• Sales representative appointments of **John R. Montrose** to the San Francisco office, **John A. Berka** to the Newark office, and **John M. Powell** to the Cincinnati office have been made by Mueller Brass Co., Port Huron, Mich.

• **Dr. Walter H. Zinn,** former director of Argonne National Laboratory at Lemont, Ill., was honored March 27 at the opening session of the American Power Conference. Mr. Zinn was presented with the conference's Certificate of Merit in recognition of his contributions in the field of nuclear power generation, and pioneering achievements in atomic research.

(*Concluded on page* 12)

And for the Scouts — A FUTURE OF FAULTLESS SERVICE

NATIONAL HEADQUARTERS BUILDING
GIRL SCOUTS of the U.S.A.
New York, N. Y.
WILLIAM T. MEYER
architect
SKIDMORE, OWINGS & MERRILL
consulting architects
FEIN-SCHLOSBERG INC.
plumbing contractor
DAVIS & WARSHOW INC.
wholesale distributor
AMERICAN RADIATOR & STANDARD SANITARY CORP.
plumbing fixtures manufacturer

NATIONAL HEADQUARTERS BUILDING
BOY SCOUTS of AMERICA
New Brunswick, N. J.
CHAPMAN EVANS & DELEHANTY
architects and engineers
FRANK A. McBRIDE CO.
plumbing contractor
PATERSON SUPPLY & ENGINEERING CO.
wholesale distributor
AMERICAN RADIATOR & STANDARD SANITARY CORP.
plumbing fixtures manufacturer

Reflecting the tremendous growth of the Scouting movement in the United States are these handsome headquarters buildings . . . both COYNE & DELANY installations. The 13 story Girl Scout Headquarters, now under construction, will feature an aluminum and heat absorbent glass facade and will represent a $3,725,000 investment in efficiency for over 2½ million Girl Scouts. Already in use, the recently completed Boy Scout Headquarters reveals a low silhouette on 40 country acres and will serve over 4,526,000 boys and leaders at a construction cost of $3,000,000. Here, where two separate owner organizations are concerned, where two sets of specifying and buying factors are involved, DELANY flush valves formed the base specification and were ultimately selected for each project. For healthy growth, based on confidence and proven performance, consider DELANY — "the fastest growing name in flush valves!"

This new "HAND BOOK and CATALOG No. 53" is the most comprehensive of its kind—designed for everyday reference . . . 19 pages of installation details for exposed, concealed and special FLUSH VALVE installations . . . over 75 blue prints . . . cut away views . . . many pages of charts, formulae, piping details . . . sent free, if requested on firm letterhead.

COYNE & DELANY CO. • 834 KENT AVE. • BROOKLYN, NEW YORK
IN CANADA: THE JAMES ROBERTSON CO., LTD.

DELANY *Flush* **VALVES** Since 1879

BRIEFLY STATED

(*Concluded from page* 10)

• Appointment of **James E. Crum** as Central district sales supervisor with Barnes Manufacturing Co., Mansfield, Ohio, is announced. In his new position, Mr. Crum will be responsible for sales activities in a territory which includes Ohio, lower Michigan, Eastern Pennsylvania and Northern Kentucky.

• **Gerry Powell** has been appointed assistant sales manager for White-Rodgers Co., St. Louis, Mo. Mr. Powell has been serving as manager of the company's Chicago region.

• L. J. Wing Mfg. Co., Linden, N. J. announced the appointment of **McCotter and Sons Co.,** Milwaukee, as sales representatives. The territory covered will include all of eastern Wisconsin.

• Two appointments were made in the sales department of Fulton Sylphon Div. of Robertshaw-Fulton Controls Co. Knoxville, Tenn. **Marvin G. Calhoun** was named supervisor of the bellows sales division, after serving as application engineer since 1942. **J. H. Fielden,** who joined the division in 1940, was appointed application engineer.

• **J. S. Morgan** has been appointed director of domestic sales for Allis-Chalmers Industries Group, Milwaukee, Wis. Mr. Morgan, who had been director of utility sales for the group, will be on the staff of the vice president, director of sales.

• The appointment of **M. J. McCaughey** as regional sales manager of the Tuthill Pump Co., Chicago, Ill., has been announced.

• **J. C. Fosselman** has been appointed sales manager of the Stoker Division of Canton Stoker Corp., Canton, Ohio.

• On March 1, **John H. Carter** became manager of the St. Louis branch office of Frick Company, Waynesboro, Pa. Since 1945 he has been a consulting engineer specializing in refrigeration and air conditioning, and also a project engineer with Sverdrup & Parcel, Inc.

• **J. E. Brinckerhoff** was elected a vice president of The Babcock & Wilcox Company at a meeting of the board of directors. Mr. Brinckerhoff will continue to be responsible for the operations of the company's Refractories Division, of which he has been manager for the past four years.

• **Paul H. Krueger** has been appointed manager of manufacturing of The Hays Corporation, Michigan City, Ind. Associated with the company since 1929, he brings to his new position wide experience from the engineering and production areas of the company.

• **Norbert W. Enslen Co.,** Dayton, Ohio, has been appointed manufacturer's representative for the sale of Cleaver-Brooks boiler equipment.

• **General Fittings Co.,** East Greenwich, R. I., has purchased the **Hayden Heater Co.,** Easton, Md. Hayden's manufacturing facilities have been moved to East Greenwich where they will continue as the Hayden Heater Division of General Fittings Company. Sydney J. Hayden, former president, continues as general manager of the division.

• Line Material Company is now **Line Material Industries, McGraw-Edison Co.,** Milwaukee, Wis. The title change comes out of the recent consolidation of McGraw Electric Company and Thomas A. Edison, Inc. L-M has been a division of McGraw since 1949.

• **William W. Wallace,** general manager of the International Division of Servel, Inc., has been elected a vice-president of the company. Mr. Wallace will continue in charge of the International Division.

• Opening of a Richmond branch office to serve Southern Virginia and appointment of **Jack B. Porter** as manager was announced by Powers Regulator Co., Skokie, Ill.

• **J. Wesley Floreth,** manager of Industrial Refrigeration Sales, York Corporation, has been promoted to manager, Midwest district, with headquarters in St. Louis.

• **John C. Wallace** has been named vice-president of engineering for the Walworth Company, New York, N. Y. Mr. Wallace was formerly vice-president and general manager of Hunt-Spiller Mfg. Corp., Boston.

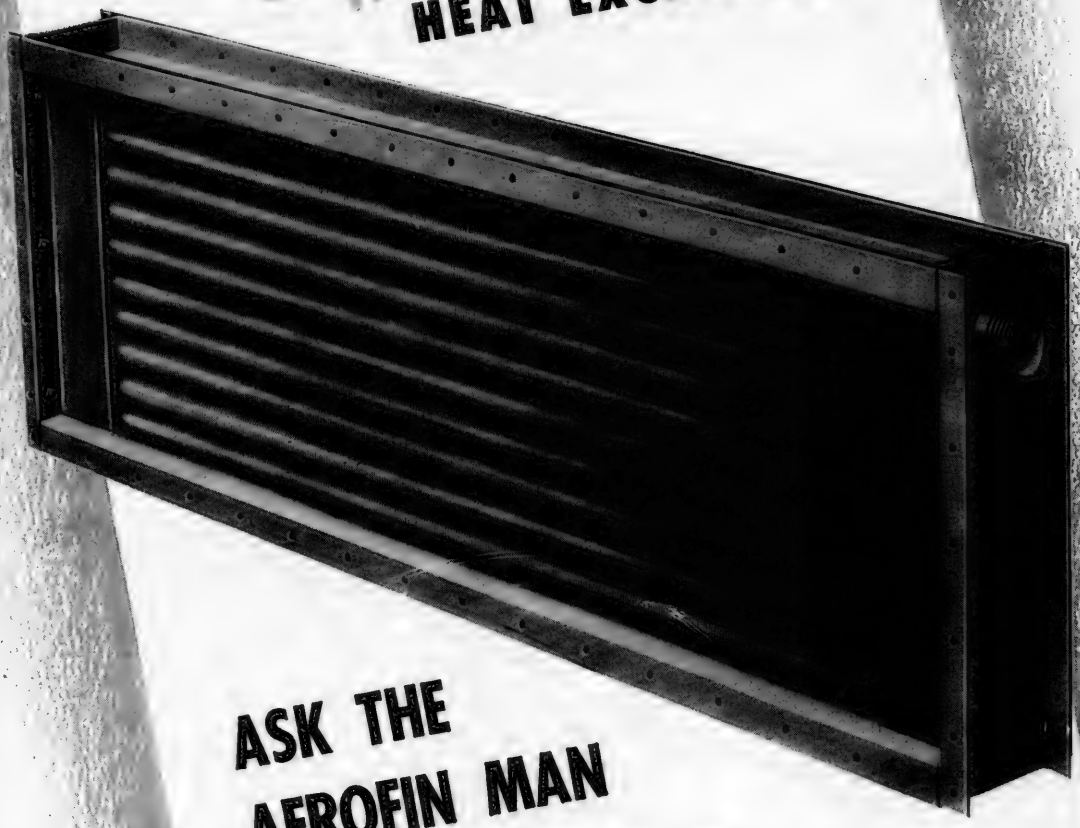
• At a meeting of the Fuel Oil & Water Heater Manufacturers' Association, a group of leading manufacturers of shell and tube type heat exchange equipment, officers for 1957 were elected. These officers are president, **Charles E. Drake** of Patterson-Kelley Inc.; vice president, **Walter Veit** of Manning & Lewis Engineering Co.; and secretary, **William B. Gorey** of Adsco Industries, Inc.

• At the Bell & Gossett Company's annual shareholders meeting, **Harold A. Lockhart** was elected a member of the board of directors. Mr. Lockhart is a vice president and has held the position of chief engineer for the past 25 years. Also announced is that **W. A. Boone,** formerly the company's sales manager will now direct sales activities as vice president in charge of sales. Assisting him will be **A. B. Meeg,** former assistant sales manager, now advanced to the position of sales manager.

• Lancaster Pump & Manufacturing Co., Inc., Lancaster, Pa., announced the retirement of their general sales manager, **H. L. Frensdorf.** He will remain in the employment of the company in a semi-active status as a member of the Advisory Committee. Mr. Frensdorf's duties and responsibilities will be assumed by company's field sales manager, **Paul Carpenter.**

• **August Rust-Oppenheim,** president of Anemostat Corp. of America, has been appointed chairman of the Heating, Air Conditioning and Ventilating Division of the New York City Cancer Committee's 1957 April Cancer Crusade.

*FIRST LINE *Extended-Surface* HEAT EXCHANGERS



ASK THE AEROFIN MAN

Specify Aerofin and you specify high efficiency, long service life and low maintenance and service costs.

Take advantage of Aerofin's unequalled experience, production facilities, and materials-testing and design research—of Aerofin's complete engineering service at the plant and in the field.

Ask the Aerofin man.

* Aerofin makes extended heat surface exclusively — not as a by-product, not as a side-line. Sold only by manufacturers of fan-system apparatus. List on request.

AEROFIN CORPORATION
101 Greenway Ave., Syracuse 3, N. Y.

WAGNER ELECTRIC MOTORS...THE CHOICE OF LEADERS IN INDUSTRY

National Home Office of the Allstate Insurance Company.

Wagner Motors help B & G Pumps meet their toughest test... QUIET OPERATION!

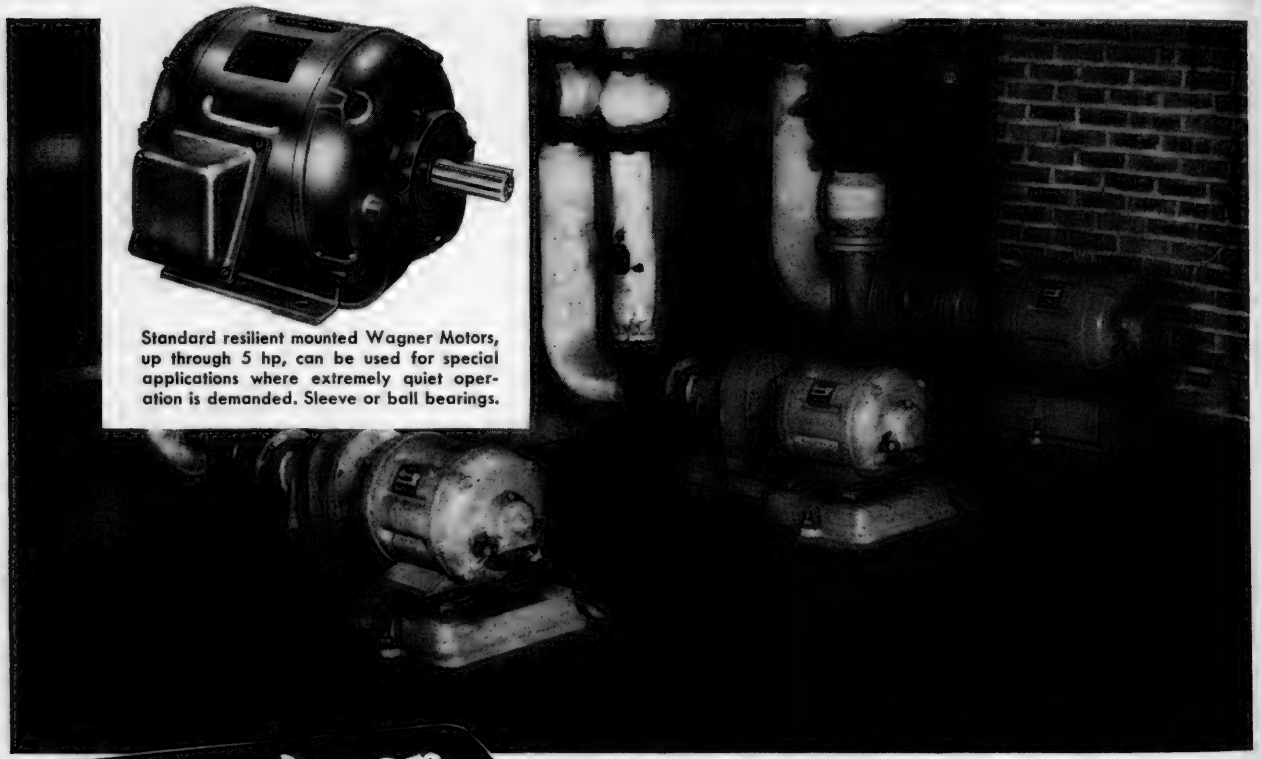
Circulating pumps used in hot water heating systems must be silent—vibrationless in operation, since they are the connecting links between the boiler room and the structure itself. A prime requirement for quiet pump operation is an electric motor that operates almost silently, yet has plenty of stamina to hold up under years of hard, steady operation.

That's why Bell & Gossett Company used Wagner Motors on the Universal Pumps in the Allstate Insurance Company home office. These quiet-type motors are known for smooth balance and quiet operation.

Perhaps you have a specialized motor application . . . if so, remember, there's a Wagner motor to fit every need . . . a complete line for all current specifications with a wide variety of enclosure types and mountings.

Your nearby Wagner engineer can help you select the *right* motor to meet your specifications. Call the nearest of our 32 branch offices or write us.

Standard resilient mounted Wagner Motors, up through 5 hp, can be used for special applications where extremely quiet operation is demanded. Sleeve or ball bearings.



Wagner Electric Corporation
SERVING INDUSTRY SINCE 1891

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation
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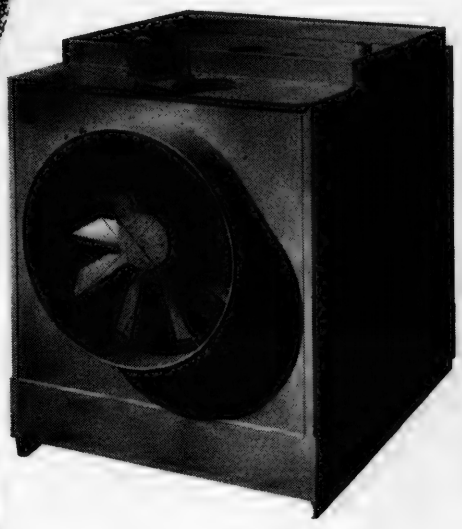
M57-7

2 ways to win friends and influence customers...

1 Study Public Speaking



2 Sell Marley Aquatowers

The contractor who is in business to *stay* knows that consistent and lasting performance in an air conditioning installation speaks louder than words. That's why a majority of successful contractors simply standardize on Marley Aquatowers.

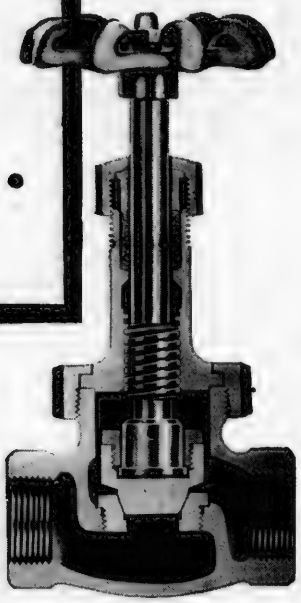
Only in Aquatowers do you and your customers get the benefit of 35 years of cooling tower engineering and production know-how —*plus* heavy steel casing . . . super-tough protective plastic finish . . . more-than-adequate filling . . . plus-performance diffusion deck . . . long-life mechanical equipment that was designed and manufactured just for the tower. Only in Marley Aquatowers do you and your customers receive a guarantee of performance and service that is backed by the world's leading producer of packaged cooling towers for all air conditioning and refrigeration services.

The impression that you make on customers with Aquatowers is a lasting one, for they are the packaged cooling towers with the future (your future) in mind. For information and prompt delivery see your Marley supplier in any of 300 cities . . . soon!

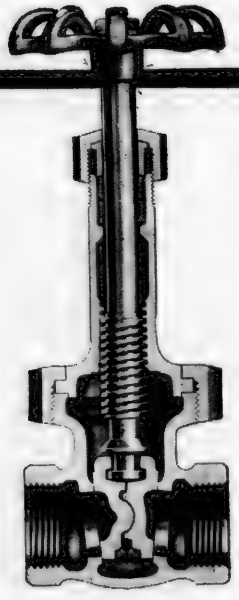
MARLEY®

The Marley Company Kansas City, Missouri

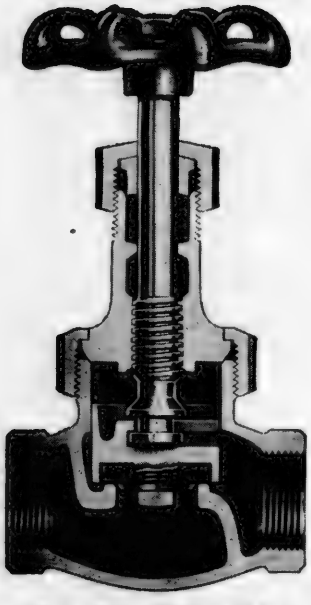
Walworth bronze valves...



Walworth No. 225P Globe Valve
500 Brinell Seat and Disc



Walworth
No. 29 Gate Valve



Walworth No. 95 Globe Valve
Re-New-Disc

built to give dependable trouble-free service on all recommended jobs

Walworth No. 95 Bronze Globe Valves (Angle Type: No. 96) are recommended for service where throttling is not required. They are rated at 150 psi working steam pressure, 500F; 300 psi cold water, oil or gas. The improved renewable disc and lock-on, slip-off disc holder — an original Walworth development—saves time and trouble. This valve can be repacked under pressure when fully opened. All parts are designed to give maximum service and strength.

Walworth No. 29 Bronze Gate Valves are rated at 200 psi working steam pressure, 550F; 400 psi cold water, oil and gas. These valves have rising stems and integral seats. Sizes 2-inch and smaller have union bonnets; sizes 2½ and 3-inch have bolted bonnets. Valves up to and including ¾-inch have solid wedge discs; 1-inch and larger have split wedge discs. These valves can be repacked under pressure when fully opened.

Walworth No. 225P Bronze Globe Valves (Angle Type: No. 227P) are rated at 350 psi working steam pressure, 550F; and 1000 psi non-shock service on cold water, oil and gas. The stainless steel, plug type seat and disc — heat treated to 500 Brinell — can be closed on sand, slag, scale and similar floatage, without injury to the seating surfaces. They are the longest wearing, TOUGHEST bronze valves you can buy.

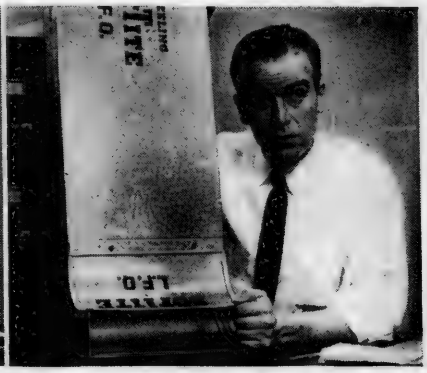
For full information about Walworth Quality Bronze Valves, see your Walworth distributor, or write:

WALWORTH
valves and fittings

60 EAST 42nd STREET NEW YORK 17, N. Y.

"We can make the most severe operations . . .

and the tightest joints and locks . . .



without fear of the zinc coat cracking because . . .

Wheeling SOFTITE® has the tightest zinc coating yet produced"

Air conditioning engineers and sheet metal fabricators are discovering untold new economies using Wheeling SOFTITE Galvanized Sheets.

For one thing, here is a sheet that really *likes* to be worked. It's soft and ductile, easy to form, easy to crimp. But more, SOFTITE has a tight zinc coating that's almost impossible to chip or flake no matter how severely it is fabricated.

And so Wheeling SOFTITE lasts far longer. Likewise ducts made of SOFTITE.

If you are not getting performance like this from your present galvanized sheet, or if you are using ordinary steel sheets for fear that a galvanized sheet can't take the strain, Wheeling SOFTITE may be your answer.

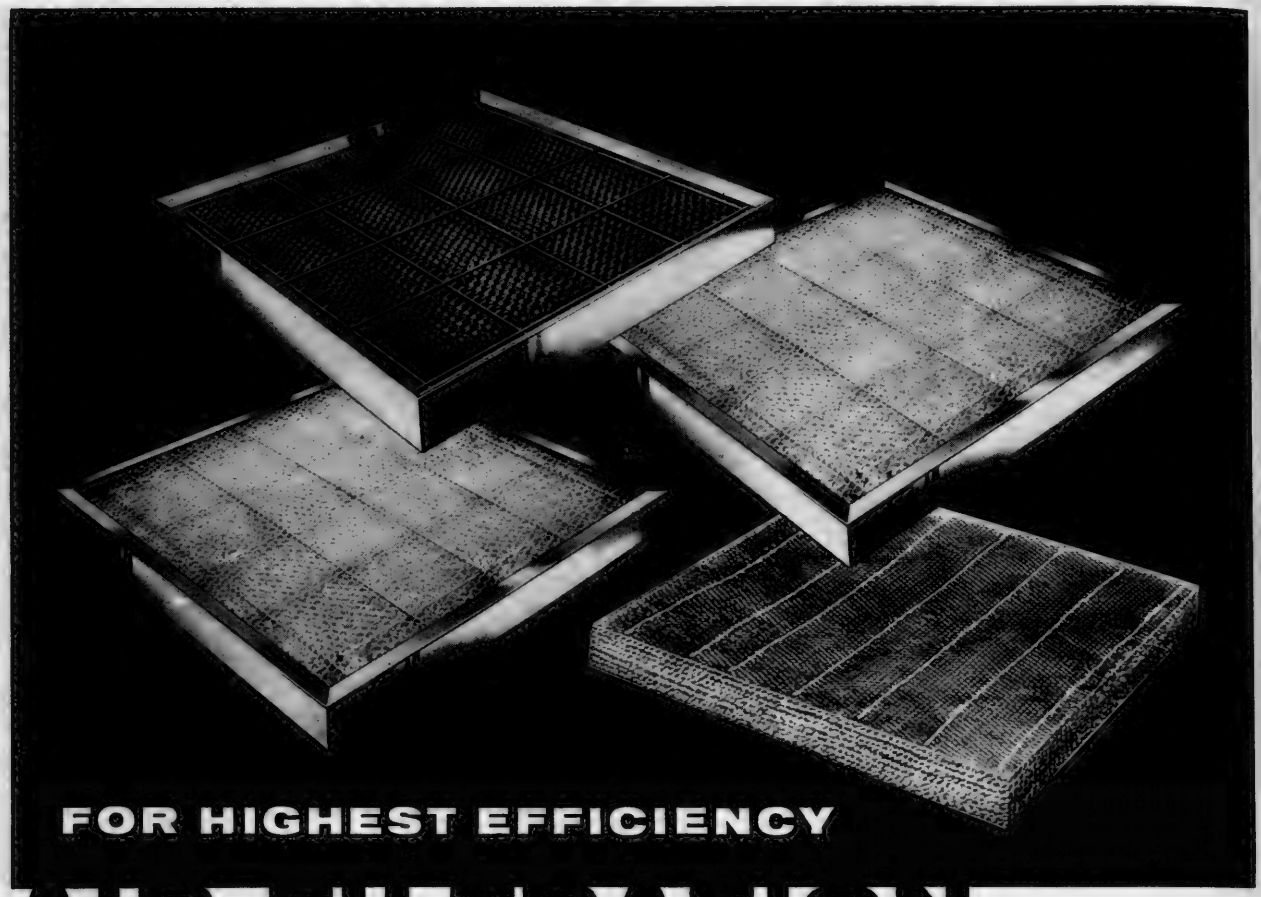
Call your Wheeling industrial supply distributor, the Wheeling sales office nearest you, or write Wheeling Steel Corporation, Wheeling, West Virginia.

IT'S WHEELING STEEL

WHEELING STEEL

DISTRICT SALES OFFICES—Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Houston, New York, Philadelphia, St. Louis, San Francisco, Wheeling

OUR CHALLENGE STANDS: ANYTHING THAT CAN BE MADE OF STEEL SHEETS CAN BE MADE OF WHEELING SOFTITE GALVANIZED SHEETS



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AIR FILTRATION

RP AIR FILTERS

FOR RESIDENTIAL, COMMERCIAL, INDUSTRIAL APPLICATIONS

EZ KLEEN

The aluminum, washable air filter that features easy cleaning and moderate cost. Standard E Z Kleen in ½", 1" and 2" thicknesses—350 F.P.M. rating. Multi-Velocity E Z Kleen in 1" and 2" thicknesses—520 F.P.M. rating. Easily washed and re-coated with Filter-Coat (dust and dirt removing adhesive) or Super Filter-Coat (dust and odor removing adhesive) for like-new efficiency.

GREASE FILTER

Aluminum grease filters for kitchen exhaust systems. End grease nuisance and resulting costly maintenance to motor and blower equipment...reduce fire hazard ...increase sanitation. Attractive aluminum improves kitchen appearance. Strong, lightweight, easy-to-handle.

INDUSTRIAL FILTER

Economical, lightweight, easy-to-clean, aluminum filters for both high or low velocities. Reduce operating costs through longer service life and top performance. Ideal for new or existing installations.

PAINT ARRESTORS

Inexpensive, disposable filter pads that remove paint overspray solids from exhausted air in paint spray booths. Simple installation, using holding frames, in banks of any size. R P Paint Arrestors are efficient in operation...versatile...economical in operating and initial costs...save floor-space...reduce down-time.

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RP ... PRODUCTS OF RESEARCH

RESEARCH PRODUCTS Corporation

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A Curtis FRANCHISE

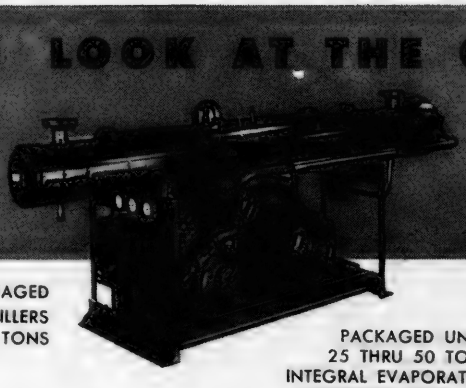
MAY BE THE ANSWER!

Curtis has been in business for 103 years and through experience has learned how to maintain a mutually profitable relationship with our franchise holders. Curtis equipment is competitively priced, quality built, and nationally advertised.

Write for details

LOOK AT THE CURTIS LINE

PACKAGED AIR COOLED UNITS UP TO 7½ TONS



PACKAGED LIQUID CHILLERS UP TO 100 TONS

PACKAGED UNITS 25 THRU 50 TONS INTEGRAL EVAPORATIVE CONDENSER OPTIONAL

YOU CAN COUNT ON

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OUR 103rd YEAR

MANUFACTURING COMPANY

REFRIGERATION DIVISION

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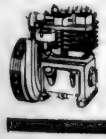
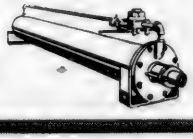
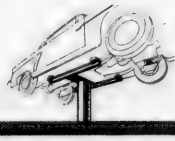


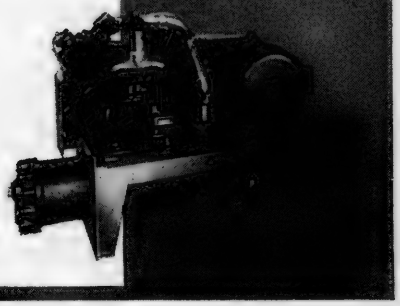
INDUSTRIAL AIR COMPRESSOR



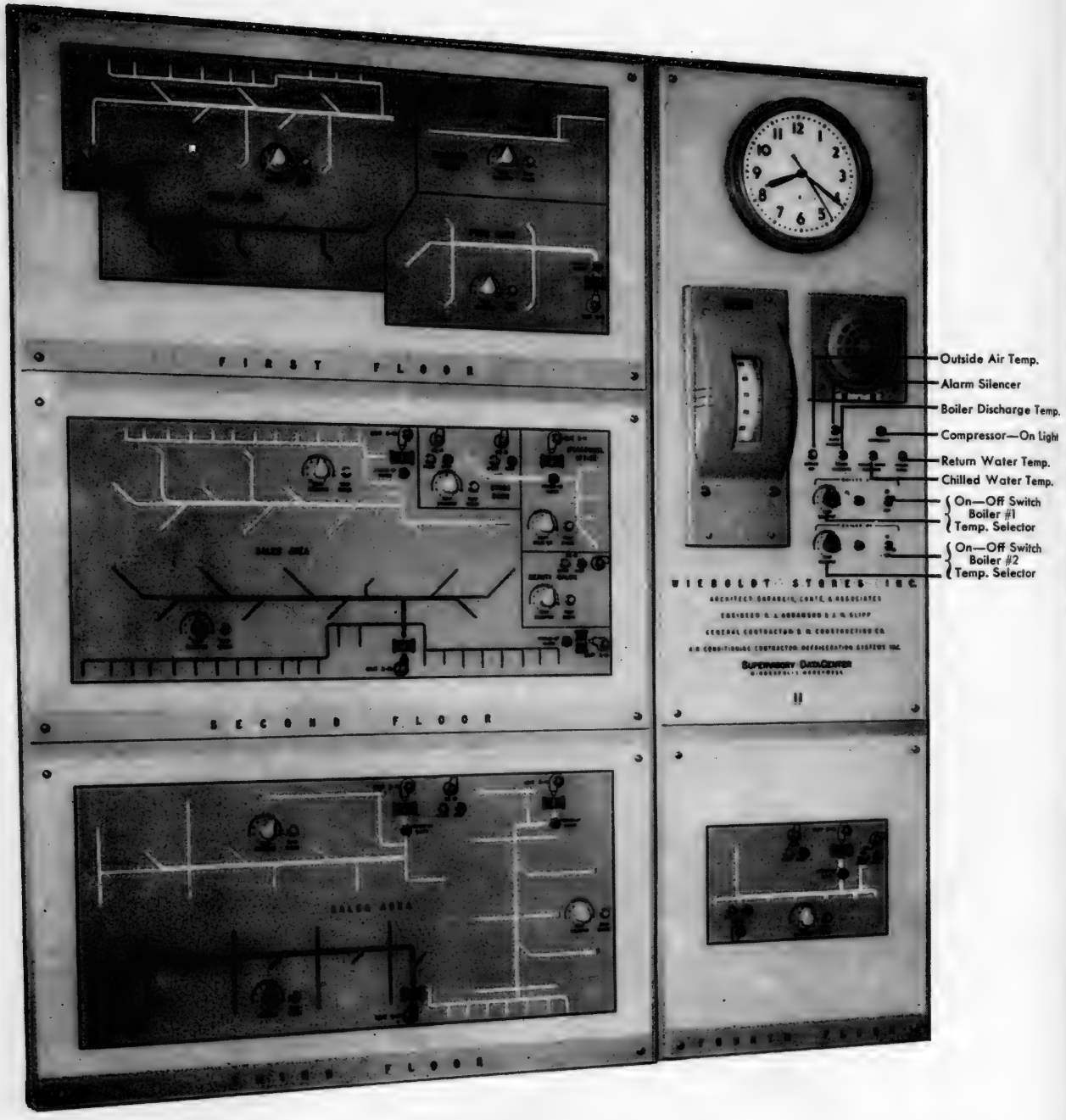
AIR HOISTS AIR CYLINDERS



AUTO LIFTS



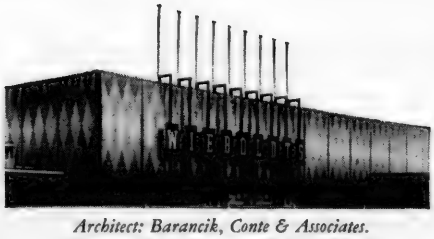
Control leadership through advanced engineering-research



How panel works. Comfort zones are displayed on floor plans, as photo above shows. Each zone has its own adjustment knob, which changes the control point of the thermostat located in the zone; each zone also has its own temperature check button. Pressing button causes the temperature to be indicated on the precision instrument beneath the clock. Operating controls for the basic heating and air conditioning system are located to right of indicator. Alarm directly beneath clock warns against danger of coil freeze-up by sound and flashing light.

For heating and cooling

Automation through Centralization– with Honeywell Supervisory DataCenter*



Architect: Barancik, Conte & Associates.
Engineer: R. J. Abramson & J. M. Klipp.
General Contractor: B-W Construction Co.
Air Conditioning Contractor: Refrigeration Systems Inc.

WITH YOUR clients in mind, consider the Honeywell Supervisory DataCenter in the new Wieboldt store, Harlem-Irving Plaza shopping center, Norridge, Illinois.

It's a good example of how the DataCenter makes it easy for the store manager or the maintenance superintendent to understand and effectively operate the air conditioning system. Controls that were before scattered throughout a building are now centralized and made easy to understand and operate—bringing the benefits of automation of heating and cooling to your clients.

From this one location near the 4th floor penthouse, the manager can read and correct immediately temperatures in any of the building's 13 comfort zones.

Furthermore, operation of the entire hot and chilled water system can be checked, at the panel, any hour of the day or night. An easily-read Honeywell instrument indicates all temperature readings—including boiler discharge and return, chilled water discharge and outside air.

And with your clients in mind what does this add up to? Greater operating efficiency with less personnel time and without specialized manpower . . . longer equipment life . . . operational savings that liquidate cost . . . attractive display of your engineering design . . . and above all, a more comfortable store.

More than 100 of these installations are now in operation throughout the country. All components of the DataCenter are manufactured by Honeywell. And *only* Honeywell manufactures pneumatic, electric and electronic controls and instruments.

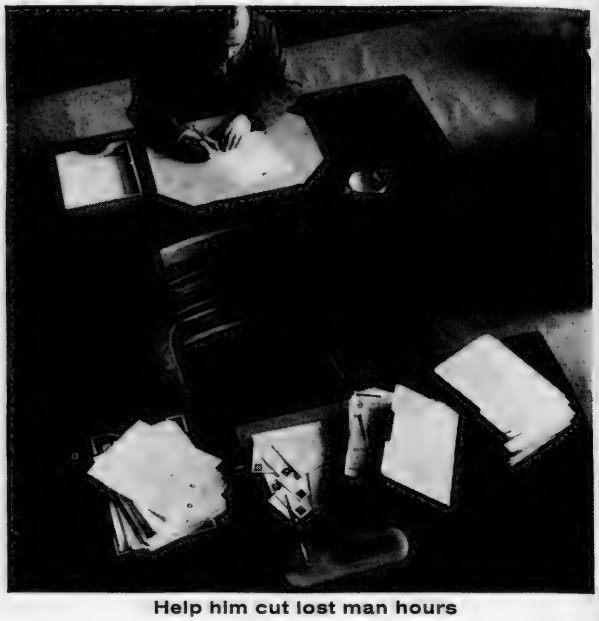
For further information about the DataCenter and other Honeywell control concepts, call your local Honeywell office. Or write to Minneapolis-Honeywell, Dept. HV-5-177, Minneapolis 8, Minnesota.

*Trademark

For news about other major Honeywell contributions to indoor climate, turn the page . . . ⟶

Who said dirt cheap?

Save your client clean-up money



Help him cut lost man hours

*New Honeywell Electronic Air Cleaner removes 6 times more costly dirt than mechanical filters**

MOST SOILING of your client's work surfaces, walls, fixtures and merchandise is done by air-borne particles less than 1/25,000 of an inch in size.

Particles much smaller than these—including the bacteria and viruses that cause many respiratory ills—can be removed by Honeywell's new Electronic Air Cleaner.

It is an impossible job for the mechanical type filter to remove oil smoke, fumes, tobacco smoke and much of the dust and fly ash that fall into this microscopic class of contaminants. And these are the ones with the greatest staining power.

The new Honeywell Air Cleaner's wide range of protection offers a scientific way to cut the high costs of cleaning, soiled merchandise, mechanical failures and absenteeism by trapping air-borne dirt *before* it has a chance to steal your client's profits.

Whatever business he's in, he will find the many advantages of a Honeywell Electronic Air Cleaner more than pay for its installation. For details call your local Honeywell office or write Minneapolis-Honeywell, Dept. HV-5-177, Minneapolis 8, Minnesota.

**According to the National Bureau of Standards tests, electronic air cleaners remove at least 90% of the dirt particles causing the greatest staining, while ordinary mechanical filters remove only about 15%.*

Honeywell Electronic Air Cleaner

To aid the engineer—Honeywell makes a complete range of Electronic Air Cleaners for any type of air conditioning or ventilating system. Number of cells is determined by amount of air handled by the system. *Module construction* makes installing and servicing easy. Sales and service aid available in 112 Honeywell offices across the nation.

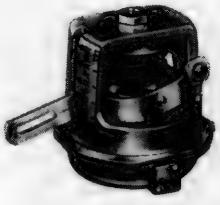
Honeywell

First in Controls

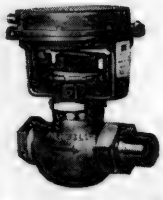
Use the Honeywell unit ventilator team

3 controls designed to work together for one purpose only--better unit ventilator performance

L0907 Air Stream Thermostat. Fits any ventilator end compartment, has fast response and fewer moving parts. Exclusive snubber action gives unequalled stability. Thus, when occupancy in room reduces the heating load or when fresh air controlling is called for, the L0907, working with the room thermostat, resets the air temperature delivered by the unit ventilator to exactly balance heating or cooling demands of the room.



M0516 Damper Motor. Rolling diaphragm here reduces friction and, as a result, gives more precise positioning. Diaphragm prevents sticking, thus adds to modulated action of the Honeywell control team. Very small, compact unit fits any unit ventilator, yet is amply powered to move the damper.



V0512A Valve. Gives balanced modulation of steam flow. High temperature rolling diaphragm combined with low-friction Teflon cone packing gives improved modulation, eliminates jerky step-by-step action and gives smooth positioning. Slightest signal from the thermostat will reposition the valve. Exclusive "equal percentage" valve plug means one valve gives small valve performance on light loads and large valve capacities on heavy loads. On light loads a change in valve position produces a slight change in heat delivered—at heavy loads the same change in position produces a very sizeable change in heat delivered.

And 1 thermostat that has no equal

Honeywell Pneumatic Round—T0910A. Low mass bi-metal gives fast response to temperature changes. Force-balance feedback principle gives linear response of the control air pressure to changes in room temperature under all conditions. Thus, proportionate amounts of heat are delivered into the room—in balance with change in the thermostat. Modern in design and appearance, it is easy to calibrate and adjust. Equipped with plug-in gage connection for ease of calibration. Comes in many models, including day-night fan cycle control.

Honeywell's unit ventilator control team eliminates hot and cold blasts, gives even, modulated air flow

THIS Honeywell control team of room thermostat, air stream thermostat, valve and damper motor exclusively developed for unit ventilators, levels out the peaks and valleys of heat and cold, troubles all too familiar in the nation's schools.

What's more, the air temperature delivered by the ventilator changes only as a result of a change in room temperature. Cycles of hot to cold are sensed by the air stream thermostat and corrected before they start.

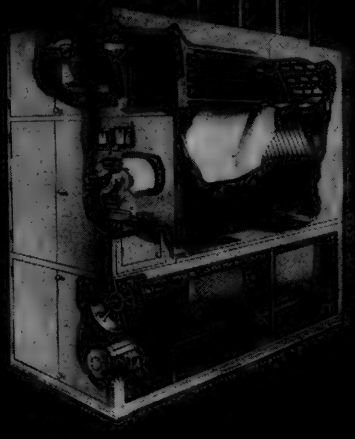
Honeywell unit ventilator controls are backed by a service organization that is immediately available, in 112 offices, nation-wide.

For full information, call your local Honeywell office. Or write Minneapolis-Honeywell, Dept. HV-5-177, Minneapolis 8, Minnesota.

Honeywell

First in Controls

Only Honeywell gives you all four—pneumatic, electric, electronic, instruments.



new Dravo heater
speeds air flow with

high-efficiency airfoil combustion chamber

Based on aerodynamic principles, the stainless steel combustion chamber of the all-new Dravo *Counterflo* heater is a true airfoil shape. Dravo's research team took two airplane wing sections and placed them back-to-back. The result is a shape that permits maximum air flow with minimum resistance. Every square inch of the chamber is "wiped" by the air stream, and faster, more efficient heat transfer is accomplished. The new Dravo combustion chamber brings you these exclusive features:

- **True airfoil design**
- **Larger sizes ribbed for greater strength . . . channeling of air flow**
- **Stainless steel construction . . . guaranteed for 10 years**
- **Aluminized steel economizer tubes for corrosion resistance . . . guaranteed life**
- **Four-pass flame travel for maximum heat transfer**

The combustion chamber is an important part of the *unitized* design of the all-new Dravo *Counterflo* heater. New induced draft firing, revolutionary PYROJET burner, low-speed fans deliver high velocity airflow through new discharge plenum . . . all combine to make the new Dravo *Counterflo* a remarkably efficient and economical heater.

Write for full information on this remarkable new Dravo heater. There is a size and type for every heater application—for economical space heating—for process drying—for tempering make-up air, as a duct furnace for combination heating, air conditioning and for a host of other applications. Address Dravo Corporation, Pittsburgh 22, Pennsylvania.

Ask for Bulletin 564-25

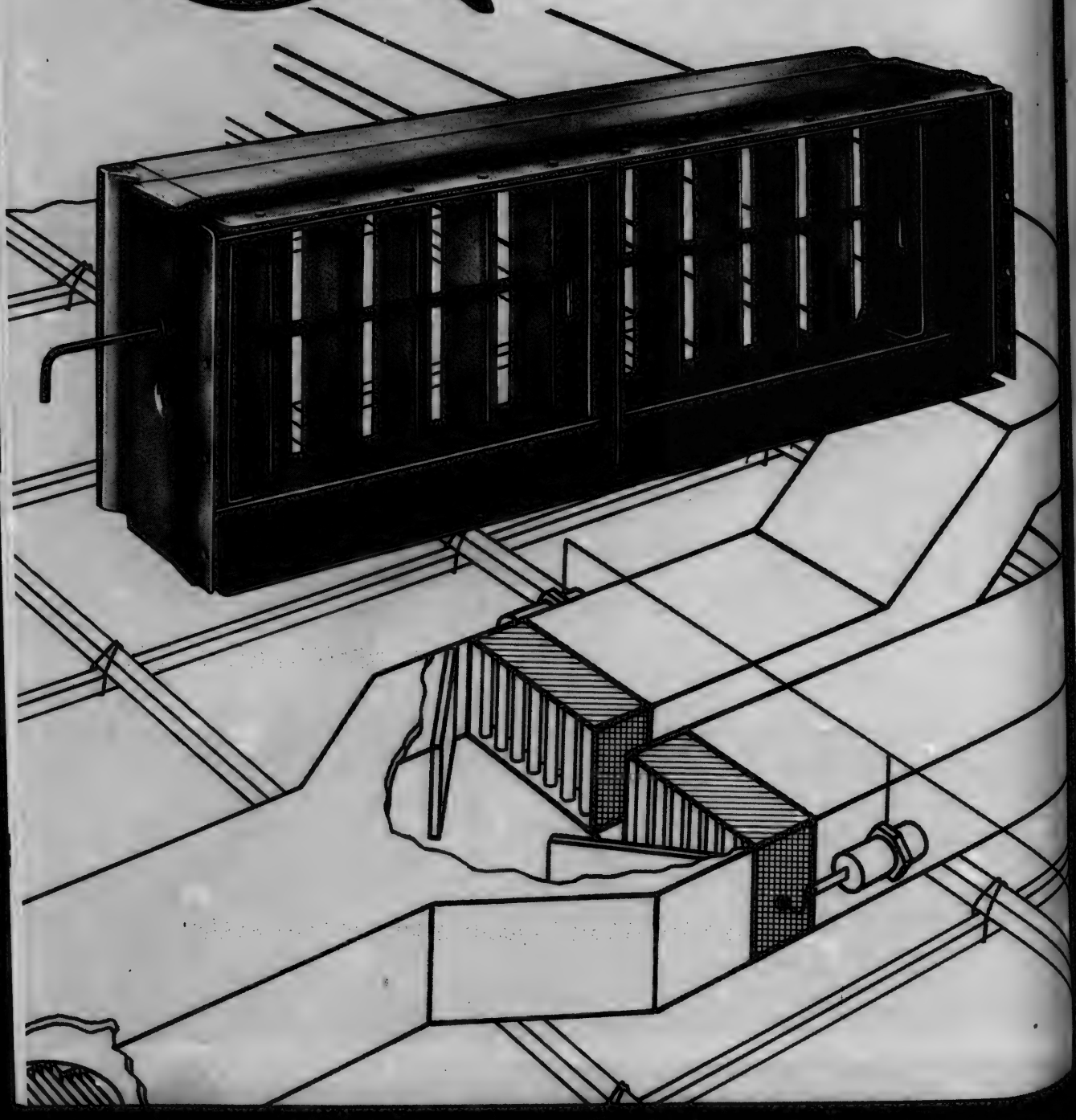
DRAVO
CORPORATION

Blast furnace blowers • boiler and power plants • bridge sub-structures • cab conditioners • docks and unloaders • dredging • fabricated piping foundations • gantry and floating cranes • gas and oil pumping stations • locks and dams • ore and coal bridges • process equipment • pumphouses and intakes • river sand and gravel • sintering plants • slopes, shafts, tunnels • space heaters • steel grating • towboats, barges, river transportation

...a *quiet* pressure

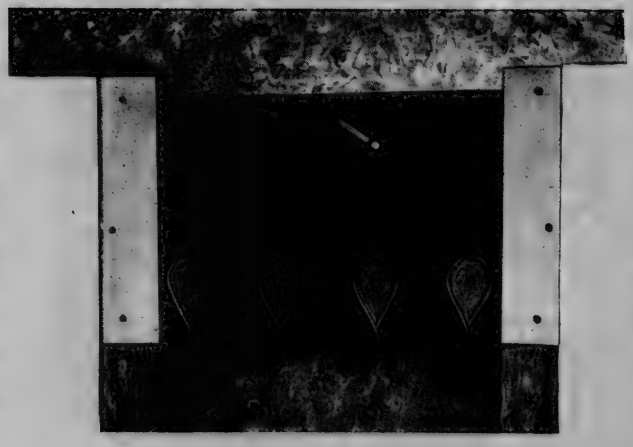
T & B®

TYPE PRV

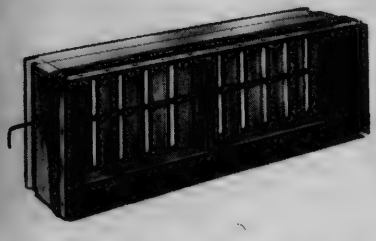


reducing valve for use in *both* high and low velocity air distribution systems

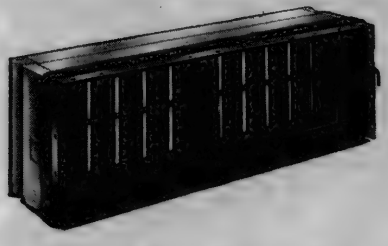
Tuttle & Bailey Type PRV PRESSURE REDUCING VALVE has wide application as a balancing damper in either the supply or return portions of high and low velocity systems. Unlike most dampers that generate noise when pressure drops of .15″ H_2O are taken across them, the PRV is designed to incorporate airfoil characteristics, permitting *quiet* handling of pressure drops up to 3.0″ H_2O. To trap and absorb sound energy, the valve vanes are constructed of formed metal shapes, packed with acoustical insulation, and flock coated. The PRV comes in a wide range of standard sizes in one-piece construction up to 36″ x 16″.



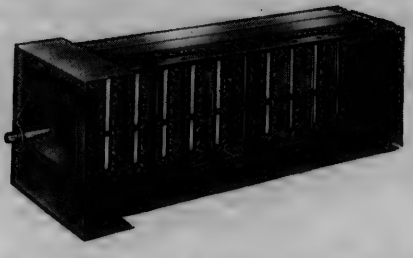
THREE STYLES AVAILABLE



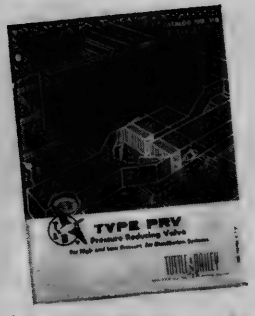
Manual Side Operation



Manual Face Operation



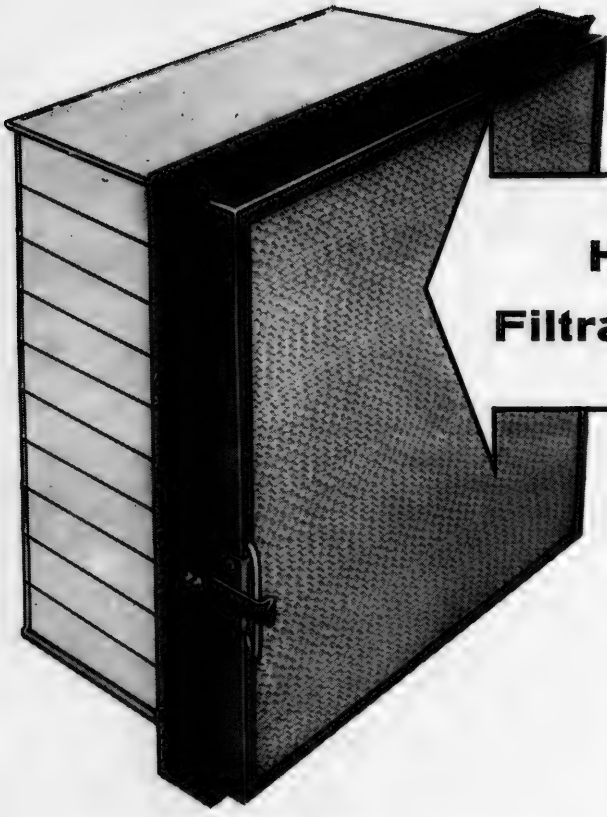
Arranged for Automatic Operation



. . . for complete information write for Catalog No. 113.

TUTTLE & BAILEY

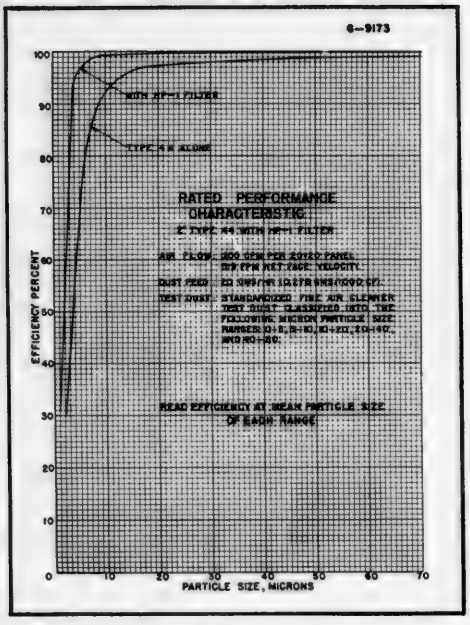
division of Allied Thermal Corp. New Britain, Connecticut



High Efficiency Air Filtration at Lowest Cost!

FAR-AIR TYPE HP
PAPER FILTER

Here is an inexpensive paper after-filter that, when used in conjunction with your present permanent filters, gives air cleaning efficiency that rivals that of the most expensive equipment . . . *at only a fraction of the cost!* Perfected after years of research, this flame-proof filter with its specially crimped media is ideal for situations where airborne dirt is critical yet budget is a factor. When used in combination with the Far-Air panel filter, dust particles as low as 2 microns in size are effectively removed. In addition to lowest first cost, the HP has a longer service life and can be replaced for pennies.



Type HP in place behind a standard FAR-AIR filter.

The HP is provided with a zinc plated wire retainer that clamps easily on most present filter holding frames. It is quickly installed without special tools. The special, flame-proof paper media gives trouble-free service.

So, where super air cleaning is a necessity, the FAR-AIR Type HP offers an excellent solution. Write for complete technical data.

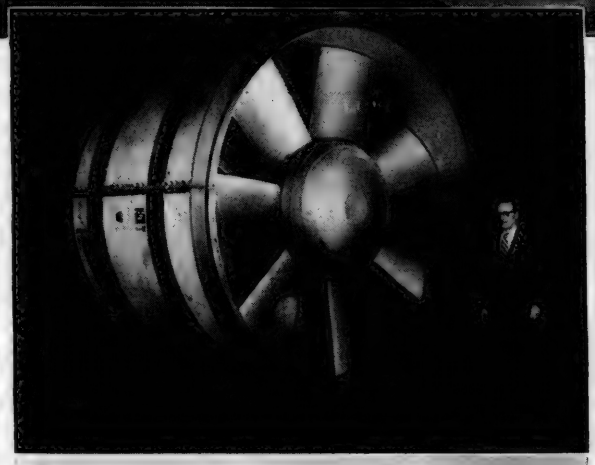
FAR-AIR HP AT A GLANCE

- *Installs without tools or special equipment*
- *Zinc plated wire frame*
- *9 to 1 filtration area to face area*
- *20 sq. ft. filtering area*
- *High velocity, minimum pressure drop*
- *Size: 20" x 20" x 8"*
- *Low replacement cost*
- *Flame-proof*

FARR COMPANY
LOS ANGELES • NEW YORK • CHICAGO • NEW ORLEANS

Manufacturing Licensees:
Farr Company Mfg. Ltd.
Montreal, Canada
The Clyde Engineering Co. Pty. Ltd.
Sydney, Australia
Intermit Ltd.
Birmingham, England

Originators of **FAR-AIR** *Certified Filter Service*



LING PACKAGE!
ooling a large boiler
to complete satis-
, these 4 "Buffalo"
Flow Fans shown
were made up as a
"package" for sim-
installation. Quiet
ghly efficient, they
a lot of air — and
a lot of excess

0,000 CFM ACID
UME HANDLER!
96" stainless steel
alo" Axial Flow Fan
ght, with cast Alumi-
heel, in a rayon mill
dia. One of four in
ame mill, ordered
period of six years.

STACK EXHAUST!
at lower right,
alo" Axial Flow Fans
ed right into stacks
aper mill do a thor-
job of exhausting
. Duct-size design
installation advan-
of these fans.

for Bulletin 3533
ck the performance
nstallation advan-
of these job-proved

WHY "BUFFALO" AXIAL FLOW FANS?

Efficiency and quiet operation — extreme efficiency where duct connections are straight, to take advantage of straight-line axial air flow. Guide vanes in "Buffalo" Vaneaxial Fans eliminate swirling motion of air — convert this energy to forward thrust. Varied pitch of "Buffalo" airfoil wheel means uniform air flow over the blades.

Installation advantages include lighter weight with rugged construction and cylindrical shape. "Buffalo" Axial Flow Fans are simple to install as part of round ductwork — and require less support than centrifugal fans of equivalent capacity. Available direct-connected, or V-belt driven thru streamlined fairing with motor outside of air stream.

The "Q" Factor, or built-in Quality which provides trouble-free satisfaction and long life in every "Buffalo" Fan.

BUFFA **Y,** BUFFALO, N. Y.

"Buffalo"

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

TILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

The one-and-only Roll-O-MATIC AAF

Don't settle for a filter that just looks like the AAF Roll-O-MATIC ... Specify the original, and be sure of Roll-O-Matic's proven advantages!

No other product in the history of air filtration has ever received the immediate acceptance, gained the overwhelming preference of AAF's amazing Roll-O-Matic. Here are some of the reasons why it has emerged in just a few short years as America's most *successful* filter:

"MIRACLE" MEDIA. Exclusive Roll-O-Mat media offers the dust-holding capacity of a viscous filter, *yet handles like dry-type media.* And a 65 ft. length of this fluffy blanket of bonded glass fibers compresses to paper-like thinness ... measures only 13" in diameter on the roll. Specially-developed AAF viscosine (for precharging media) retains its jelly-like consistency under an unusually wide range of temperature and humidity conditions.

AUTOMATIC PERFORMANCE. There are no dust disposal problems with Roll-O-Matic. They're rolled away as the automatically renewing media moves down the face of the filter. Maintenance involves simply replacing the soiled media roll with a new one, and most users have found that even this simple act is required only *once a year!*

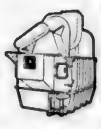
LOW-COST OPERATION. Renewable Roll-O-Mat media is inexpensive, too. Under normal conditions, operating cost of the Roll-O-Matic is just *half* that of disposable filters. Call your local AAF representative for details, or write for Bulletin 248A.

CLEAN AIR BY THE ROLL! Man points to clean media being automatically introduced by the Roll-O-Matic in the Clark Equipment Company plant in Benton Harbor, Michigan. Architects and engineers: The Austin Company.

AIR FILTER!

SUPER-CLEAN AIRI Roll-O-Matic filters are used in combination with AAF's Electro-Cell precipitators to supply 158,000 cfm of super-clean ventilation air for the new Lutheran Brotherhood Building, Minneapolis, Minnesota. Architects: Perkins & Will; Engineer: E. R. Gritschke.

AAF Dust Control Equipment



Illinois Heating Specialties

American Air Filter
COMPANY, INC.

294 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

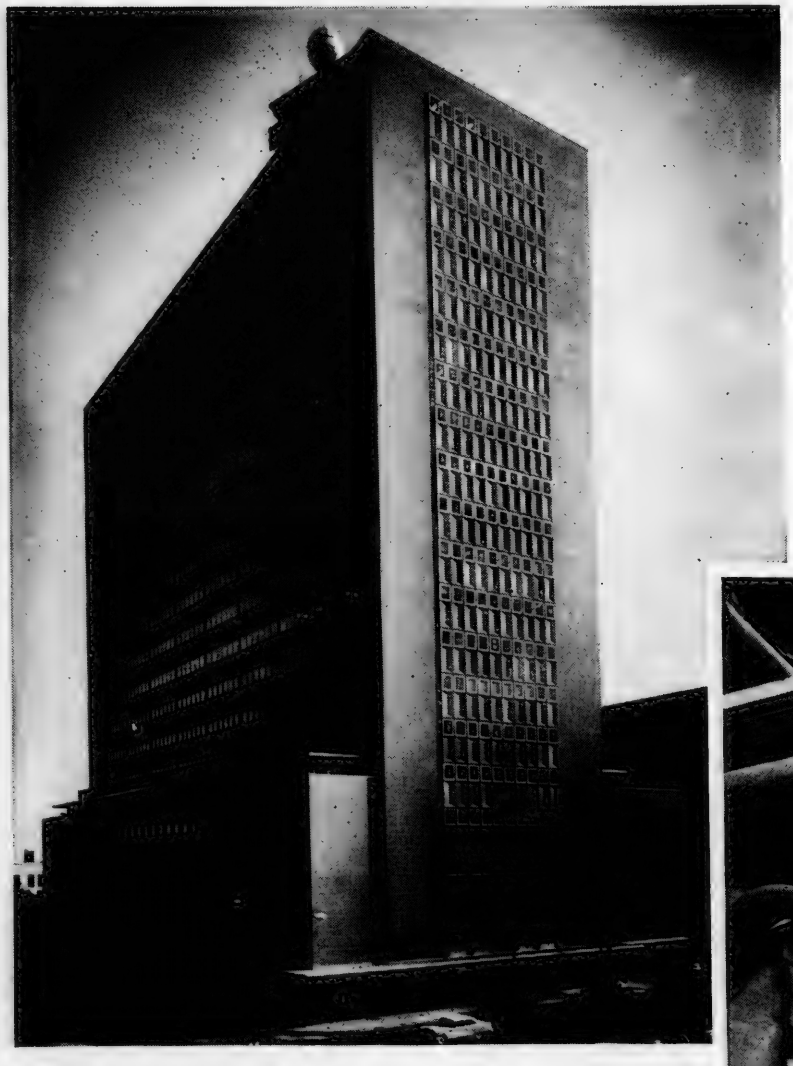
BETTER AIR IS OUR BUSINESS

Herman Nelson Unit Heaters

Herman Nelson Unit Ventilators

NATIONAL SEAMLESS PIPE

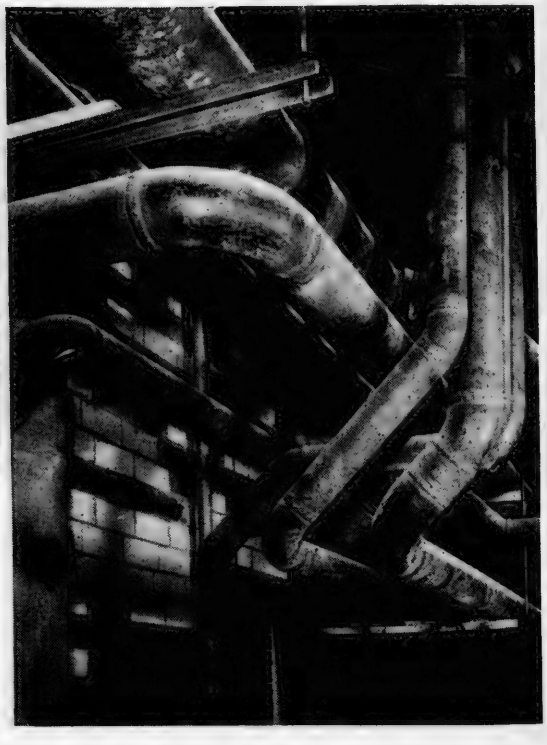
used for heating and air conditioning system of new Texas National Bank Building



USS National Seamless Pipe, in sizes from 4" O.D. to 16" O.D., was utilized in the heating and air conditioning system of this new Houston, Texas, building, owned jointly by Texas National Bank and Continental Oil Co., as follows:

Sizes 4", 6", 8", 10" and 12" are used for combination hot and chill water lines to the primary and zone conditioners as well as the perimeter units. The 16" O.D. pipe is used for handling condenser water.

The 14" O.D. pipe is part of the steam piping system which in turn converts the water into hot water for heating through the use of converters.



USS National Seamless Pipe is consistently the number one choice of engineers and contractors throughout the country for air conditioning, heating and power installations. Its ability to render efficient, trouble-free service under all types of pressure and temperature conditions has given National Seamless a reputation for safety and dependability excelled by no other pipe. For further information, or assistance with your pipe problems, get in touch with our engineers.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

NATIONAL Seamless PIPE AND TUBES

"WALLS WITHOUT WELDS"

UNITED STATES STEEL

How it Works!

Only new Sarco TD steam trap uses kinetic energy of steam to close valve

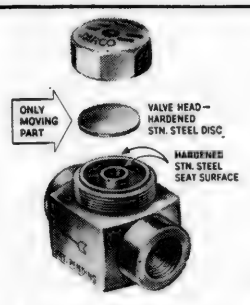
GAS MANTLES have been replaced by electric lights, steam locomotives by diesels, propeller planes by jets.

Now, the use of the kinetic energy of steam principle gives us a modern type of steam trap.

The Sarco TD obsoletes all other types for most 10 to 600 psi installations. For example, it operates without a valve closing device—no bucket, float, bellows, pins, levers or gaskets.

Glance below and you'll agree that no other steam trap is even similar to the Sarco TD!

For a trial installation—write today.



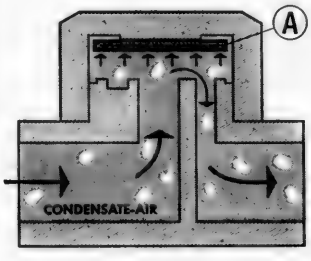
Only 3 parts...all stainless steel

Sizes 3/8 to 1"—each body is as small as a tee fitting! Capacity is determined not by a bulky body but by the effective orifice, valve action, pressure drop and condensate temperature.

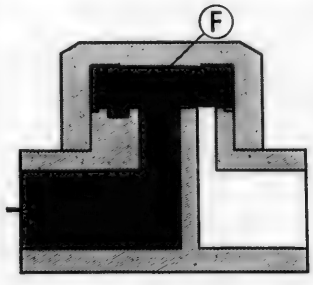
Many Advantages

1. *Practically no maintenance*—no valve mechanism, no narrow channels. Trouble-free simple design. Only 3 parts—all stainless steel.
2. *One trap for all pressures*—self-adjusting. One large capacity seat for 600 psi as for 10 psi. No changes or adjustments.
3. *Operates equally well on all loads*—on heavy, light or no condensate load. No prime to lose. No adjustments.
4. *No steam leak required*—to operate the Sarco TD. Closes tight against steam.
5. *Discharges at steam temperature and vents air* and air-steam mixtures at start-up and during operation.
6. *Freeze-proof*—when installed with outlet down, free to drain.

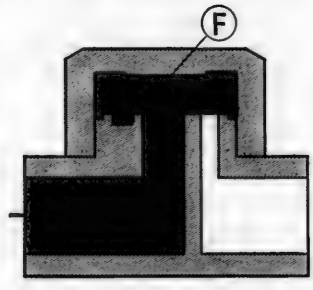
Only Sarco TD Thermodynamic Steam Trap Uses This Unique Operating Principle Which Permits Trouble-Free TD Design



1. Inlet pressure raises disc "A" from seat... immediate discharge of air and condensate at steam temperature.



2. Steam follows the condensate and the high velocity jet across the bottom of disc "A" creates a low pressure area (Bernoulli effect)...the jet is deflected into chamber "F" where it builds up pressure by recompression and this pressure acts on the top of the disc "A"...



3. Pressure in chamber "F", acting on full top area of disc "A", exceeds force of incoming steam and low pressure area under the disc...and immediately forces it down, closing the inlet. As condensation decreases the pressure in chamber "F", the disc rises and steps 1 or 2 repeat.

60-day trial convinces...No obligation...Use coupon!

SARCO

Steam Traps Temperature Regulators Strainers Heating Specialties

SARCO COMPANY, INC., Empire State Bldg., New York 1, N. Y.

Please send me Sarco TD Steam Trap and strainer for 60-day trial. Size_____

For installation on_____

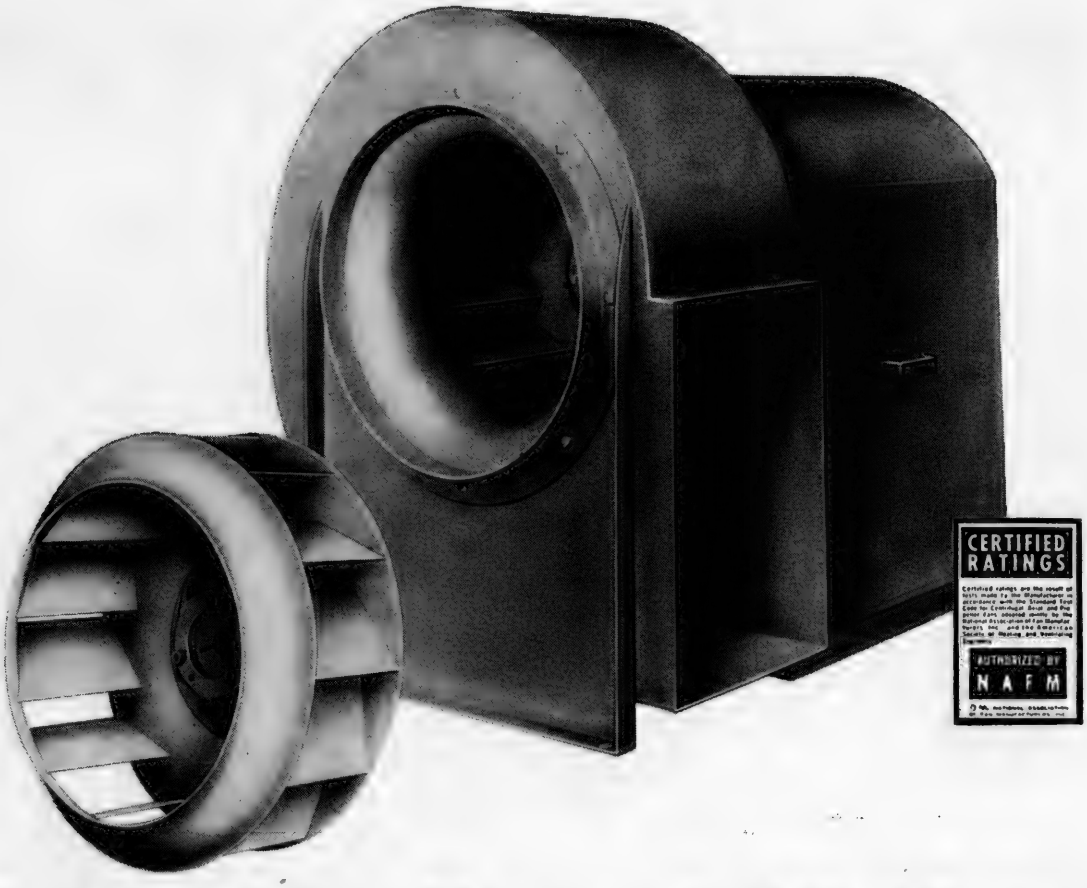
Name_____ Title_____

Firm_____

Address_____

City_____ State_____

2184-C

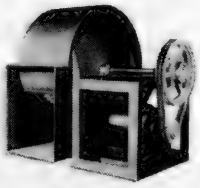


Backward Curve Blowers—Certified Ratings

Completely Designed, Engineered and Manufactured by Peerless Electric

Peerless Backward Curve Blowers are all Peerless—motor and all. We control the entire production of this versatile blower, from drawing board to finished product. We guarantee it unconditionally for quiet, trouble-free operation.

Peerless Backward Curve Blowers can be specified with confidence. They are thoroughly tested according to test codes. They meet NAFM and NEMA standards. Scores of them are operating in schools, churches, hospitals and government installations.

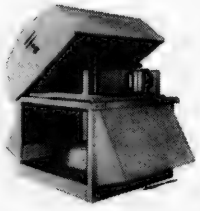


FORWARD CURVE BLOWERS

Made entirely by Peerless; arc-welded housings and frames; wheels designed for quieter operation; dynamically balanced.

CENTRIFUGAL ROOF VENTILATORS

Matching wheel cone accurately fits spun venturi for quieter, smoother air movement. All welded construction; material 16 ga. or over. Each unit air tested, and rated to assure certified PFMA ratings. Fits standard curbs.



Charter Member of the Air Moving and Conditioning Association

Peerless Electric

FAN AND BLOWER DIVISION

THE Peerless Electric® COMPANY

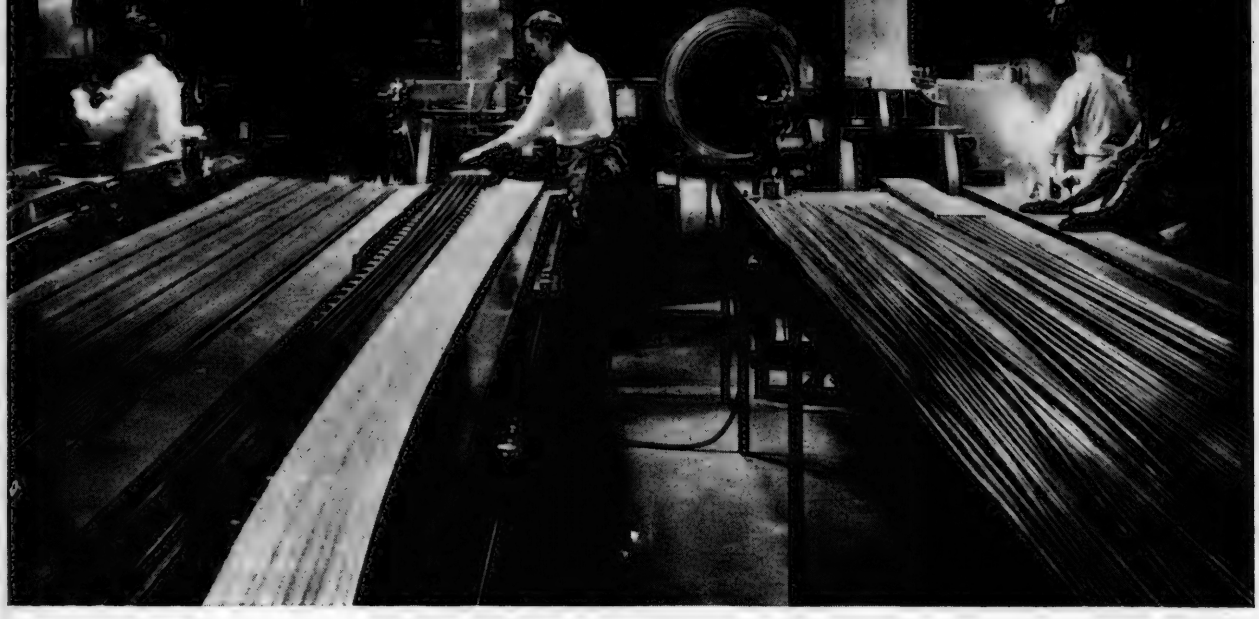
1400 W. MARKET ST. • WARREN, OHIO

FANS • BLOWERS • ELECTRIC MOTORS • ELECTRONIC EQUIPMENT

Write Today for Bulletins SDA-220, SDA-200 and SDA-160.

SO HALSTEAD & MITCHELL ENGINEERS SAID:

WE CAN MAKE FINNED COILS AS FAST AS YOU CAN ORDER THEM



DIRECT EXPANSION, STANDARD & NON-FREEZE STEAM, AND WATER COILS

If your need is for finned coils—*quality* coils—and you need them fast, then write, wire or call us. Halstead & Mitchell's unusual manufacturing facilities give us production control matched by no one in the industry, and you'll benefit by the speed with which we can produce for you.

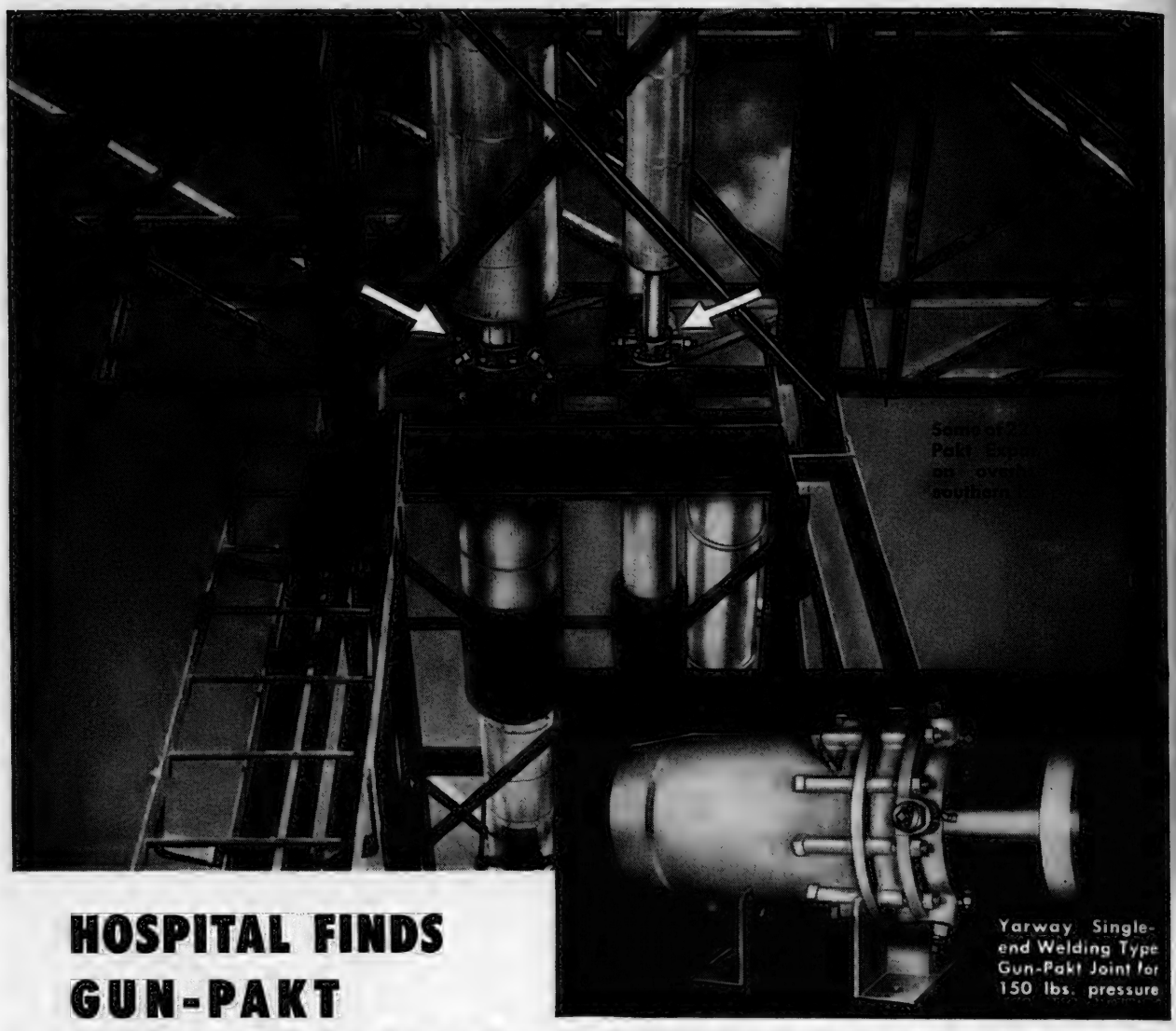
Halstead & Mitchell's "years-ahead" tooling is matched by "years-ahead" engineering. We are the only company which can offer "Turbu-Flo" fins on these coils. Thus when you order Halstead & Mitchell, you order coils with reserve heat transfer capacity. That's a real safe-performance bonus.

Note that you get this high-speed delivery and extra-capacity at a most competitive price. We are large volume manufacturers, and thus can save production costs which are passed to you in the form of attractive prices.

Want more details? Then write or call, *Halstead & Mitchell, Bessemer Building, Pittsburgh 22, Pa.*

HM

Halstead & Mitchell



Yarway Single-end Welding Type Gun-Pakt Joint for 150 lbs. pressure

HOSPITAL FINDS GUN-PAKT *SURE CURE FOR EXPANSION JOINT TROUBLES*

YARWAY Gun-Pakt Expansion Joints are just what the "doctor" ordered for this overhead steam line at a large southern hospital—and he ordered 22 of them!

In institutions, industrial plants and other large steam distributor systems YARWAY Gun-Pakt Joints are growing in popularity.

YARWAY Gun-Pakt slip-type joints give long life—no fatigue failures.

You need *fewer joints per length of line*, with traverses up to 12″ single and 24″ double.

With Gun-Pakt joints packing may be added as necessary, *under full steam pressure right on the job—no unpacking, no shutdowns.*

There's also *lower pressure load on end anchors* because excessive strains are eliminated.

All these are reasons why it will pay you to "do as the doctor ordered"—look into YARWAY Gun-Pakt Expansion Joints. Write for Bulletin EJ-1914.

YARNALL-WARING COMPANY
104 Mermaid Avenue, Philadelphia 18, Pa.
Branch Offices in Principal Cities

[redacted] **GUN-PAKT EXPANSION JOINTS**

Trane saves $27,000 a year burning coal the modern way

Consult an engineering firm

Designing and building hundreds of heating and power installations a year, qualified engineering firms can bring you the latest knowledge of fuel costs and equipment. If you are planning the construction of new heating or power facilities—or the remodeling of an existing installation—one of these concerns will work closely with your own engineering department to effect substantial savings not only in efficiency but in fuel economy over the years.

facts you should know about coal

In most industrial areas, bituminous coal is the lowest-cost fuel available • Up-to-date coal burning equipment can give you 10% to 40% more steam per dollar • Automatic coal and ash handling systems can cut your labor cost to a minimum. Coal is the safest fuel to store and use • No smoke or dust problems when coal is burned with modern equipment • Between America's vast coal reserves and mechanized coal production methods, you can count on coal being plentiful and its price remaining stable.

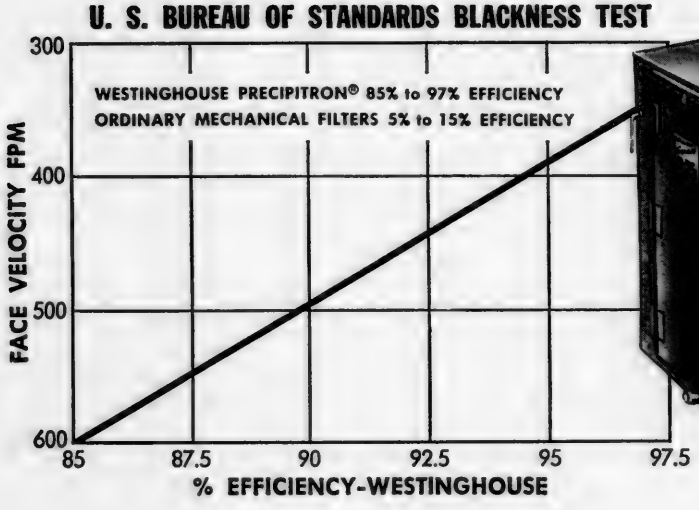
As part of its current $12 million expansion program at all locations, The Trane Company, La Crosse, Wis., a major air-conditioning and heating equipment manufacturer, has recently modernized its power plant. Steam generating facilities were changed over entirely to a coal-fired operation and a 70,000 lb./hr. boiler was added. Coal and ash handling is automatic.

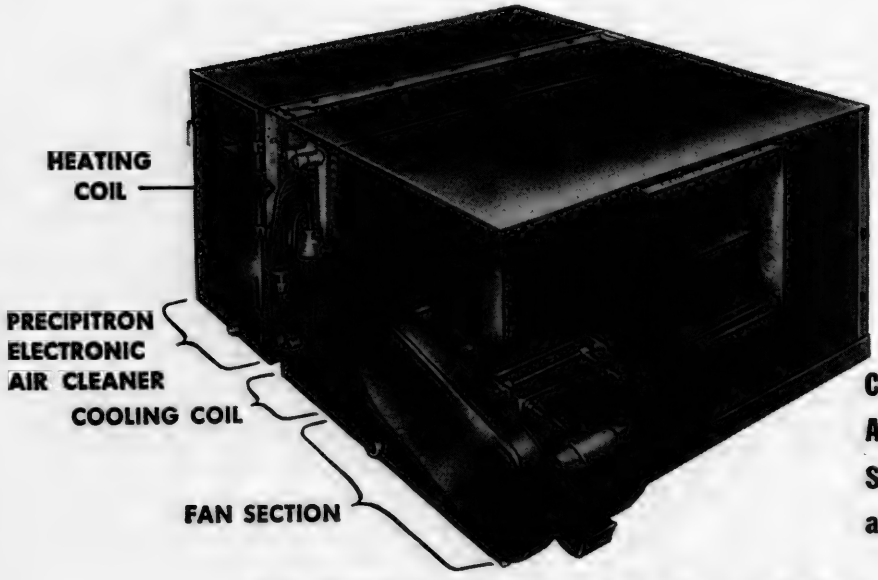
Trane has found that burning coal the modern way pays off in several ways. Overall cost of steam generation is cheaper. Fuel supply is readily available and dependable. And fuel cost savings amount to 25% over the next most economical fuel, totaling about $27,000 a year for the La Crosse plant alone.

For further information or additional case histories showing how other plants have saved money burning coal, write to the address below.

BITUMINOUS COAL INSTITUTE
Southern Building • Washington 5, D. C.

NEW "In-Line" electronic air unit air conditioning





Compact "In-Line" Westinghouse Air Distributing Unit Available In: Standard Sprayed Coil Multi-Zone and Heating & Ventilating Types

J-60623

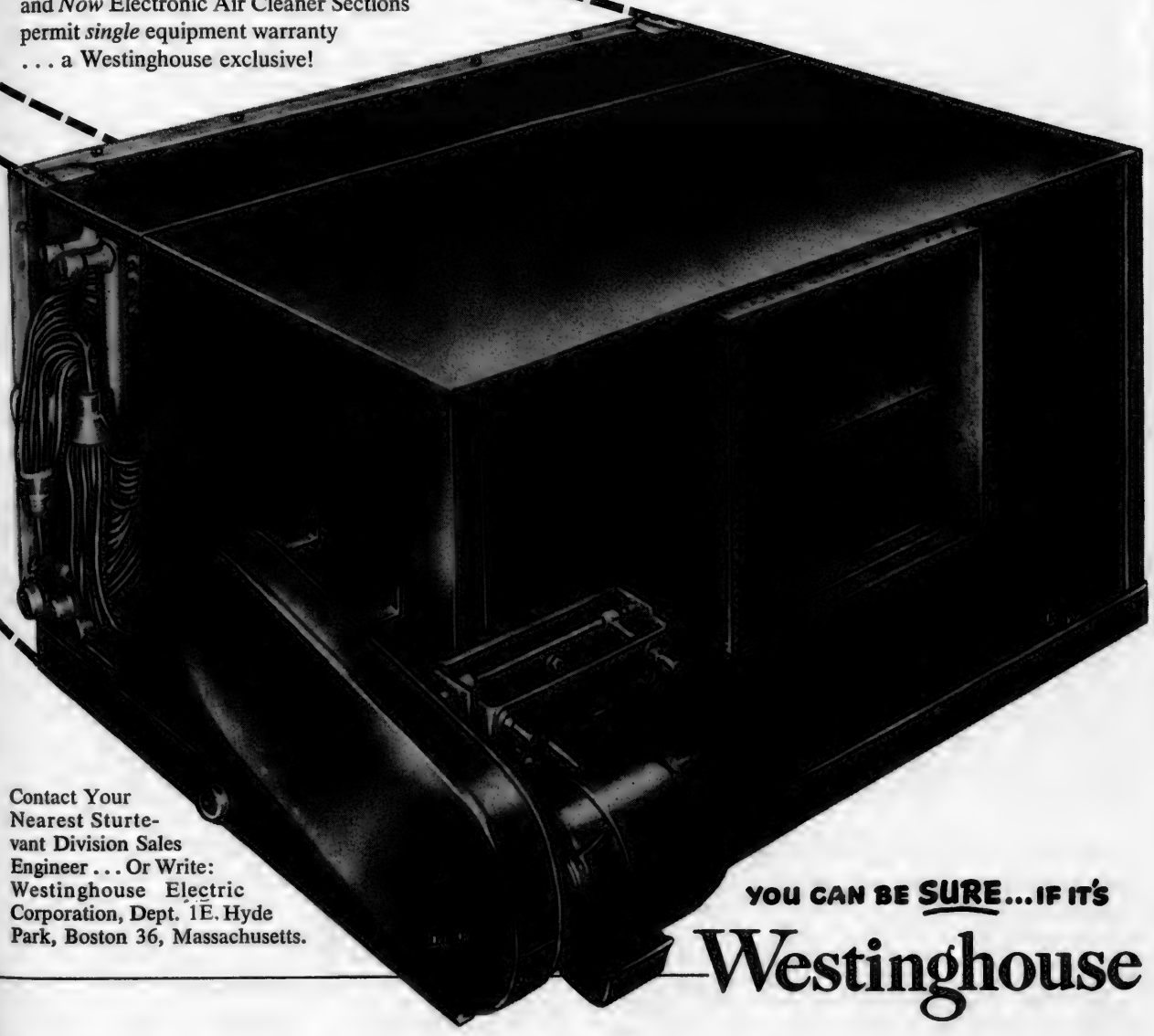
WESTINGHOUSE AIR HANDLING AND AIR CLEANING

cleaner section for your and ventilating systems

A NEW DEVELOPMENT—A WESTINGHOUSE FIRST...

Top Cleaning Efficiency at Normal Coil Face Velocities. Less Costly to Install and Operate

Westinghouse manufactured fans, motors, heating and cooling coils, and *Now* Electronic Air Cleaner Sections permit *single* equipment warranty . . . a Westinghouse exclusive!



Contact Your Nearest Sturtevant Division Sales Engineer . . . Or Write: Westinghouse Electric Corporation, Dept. 1E. Hyde Park, Boston 36, Massachusetts.

YOU CAN BE SURE...IF IT'S

Westinghouse

HALLMARK GETS THE MOST FROM AIR CONDITIONING with JOHNSON PNEUMATIC CONTROL

Hallmark Cards, Inc., Kansas City, Missouri. Welton Becket & Associates, architects and engineers; R. A. Long Company, general contractor; Interstate Heating & Plumbing Co., mechanical contractors; all of Kansas City.

Multi-Purpose Pneumatic Control System Helps Solve Diversified Production Problems, Insures Made-To-Order Working Climate

Precision regulation of temperatures and humidities makes important contributions to production efficiency in the new air conditioned home of Hallmark Cards. The "brainwork" for the air conditioning system is done by a Johnson Pneumatic Control System that matches temperature and humidity conditions to the exact needs of the work carried on in each room and area of the 760,000 sq. ft. building.

Effective control has simplified numerous problems of handling temperature- and humidity-sensitive paper stock and helps make possible consistent, high speed, quality production of famous Hallmark greeting cards.

Equally important is the provision of an ideally controlled environment for Hallmark's creative staff and office employees.

Proper control of industrial air conditioning, heating and ventilating systems is becoming increasingly important as a means of improving production, cutting costs and adding to worker efficiency. Johnson's experience in planning and installing the pneumatic control systems of countless industrial buildings can be applied profitably to your problems. An engineer from a nearby branch office will gladly give you his recommendations without obligation. Johnson Service Company, Milwaukee 1, Wisconsin. Direct Branch Offices in Principal Cities.

JOHNSON CONTROL

SINCE 1885

PLANNING • MANUFACTURING • INSTALLING

Conditioned air is supplied by 45 single-zone and 10 multi-zone units. Johnson equipment is shown above controlling outdoor air and return air dampers and hot and chilled water supplies on a typical production area unit. Space conditions are controlled by Room Thermostats and Room Humidostats.

Fast response to load shifts is a must in the 600-seat cafeteria. Sensitive Johnson Thermostats and Humidostats quickly compensate for changes in occupancy, hold temperature and humidity at ideal comfort levels. Stage and projection equipment permit the dining area to be used also for company functions.

Refreshing, perfectly regulated temperatures add to the efficiency of Hallmark's all-important creative staff. Many companies report that properly controlled air conditioning not only improves worker performance but helps reduce absenteeism and turnover and makes recruiting easier.

YOU CAN DO IT BETTER with JOHNSON PNEUMATIC CONTROL

1. Greater Simplicity—pneumatic control involves far fewer and much simpler components than anything else you can use.

2. Ease of Operation—inexpensive control pressure gauges, exclusive with pneumatic systems, give you unlimited freedom to observe and direct system operation.

3. Choice of Features—widest choice of operating features to match your needs. Johnson makes the most complete line of pneumatic temperature, humidity and pressure control equipment.

4. Less Upkeep—there are fewer components to check, fewer parts subject to failure.

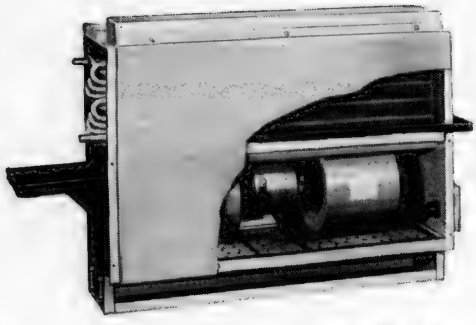
5. Reliable Performance—Johnson Pneumatic Control is unaffected by short circuits, electrical overloads, voltage variations and humidity. You get continuous, accurate control.

6. Complete Safety—even in the presence of explosive gases, solvents, dusts and other hazardous materials.

7. Maximum Flexibility—a big "plus" value in industrial work. No matter how exacting your needs, Johnson Pneumatic Control can produce the results required. It can be applied to any type or make of air conditioning, heating or ventilating system. Each Johnson System is engineered and installed to suit the requirements of the individual installation.

Why those who want the finest in

CONSOLE



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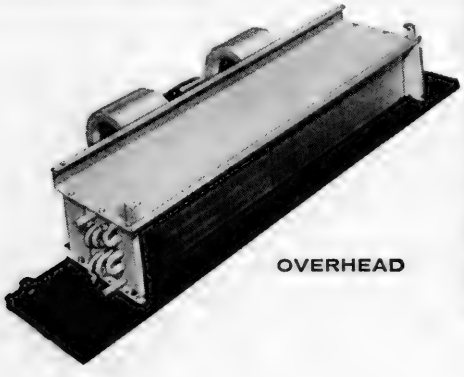
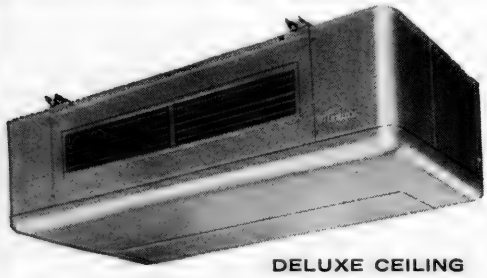


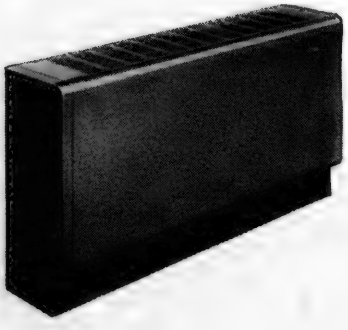
OVERHEAD



DELUXE CEILING

Modine Airditioners®

Popular fan-coil units for cooling with chilled water, heating with hot water—from a central source. For year-round air conditioning in multi-room installations. Offered in console, ceiling and concealed overhead and in-the-wall types. Four sizes range from 2/3 to 2 tons of refrigeration. Ask for Bulletin 757.



Modine CABINET UNITS

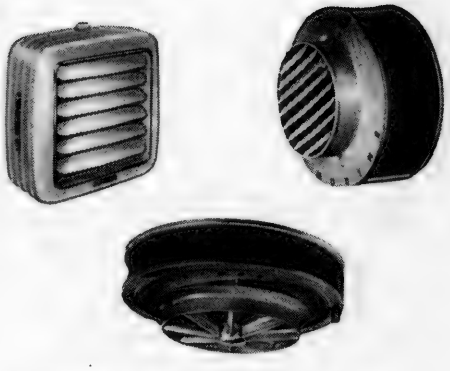
An extremely versatile line of heating and ventilating units providing quiet, positive distribution of heated air with or without ductwork. Models for cooling with chilled water. Seven distinct enclosure types, plus a variety of accessories, permit matching practically any installation or performance requirement. Capacities from 120 to 640 Edr. Write for Catalog 557.

heating and air conditioning say...

make mine Modine

AMONG building professionals and owners, the high quality of Modine heating and air conditioning equipment has long been recognized. Careful examination proves it to be a tangible value which benefits those who specify, install and use Modine products. This quality is a direct result of a company policy which is briefly expressed as follows—

"Modine products, while not premium-priced, are produced to meet those high standards of mechanical construction and performance excellence which long experience has proved essential to complete user satisfaction."



Modine GAS UNIT HEATERS

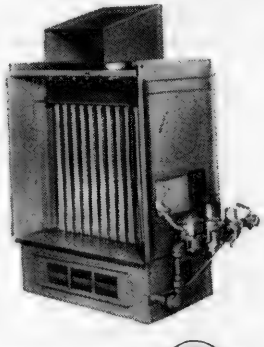
Beautifully styled units feature light weight for easy, low-cost installation . . . stainless steel burners and stainless or aluminized steel heat exchangers for longer life . . . advanced engineering design for outstanding heating performance. Eight sizes from 25,000 to 310,000 Btu. Catalog 656-A.

Modine STEAM AND HOT WATER UNIT HEATERS

Widest line available — includes horizontal and vertical delivery types plus Power-Throw models for use where extremely long "throw" is needed. All types are available in HCR models designed for application where severe internal corrosion is a problem. Bulletin 157.

Modine DUCT FURNACES

Ideal for use with cooling package or for straight heating. Stainless steel burner and heat exchanger resist rust and corrosion caused by moisture-laden air or condensation. Five sizes from 88,000 to 213,000 Btu. Bulletin 855.



Modine CONVECTORS

Attractive appearance and sturdy construction characterize the Modine line of convector radiation. Offered in 30 types and 8,000 sizes for every building need. Choice of standard or heavy-gauge enclosures. Catalog 257.

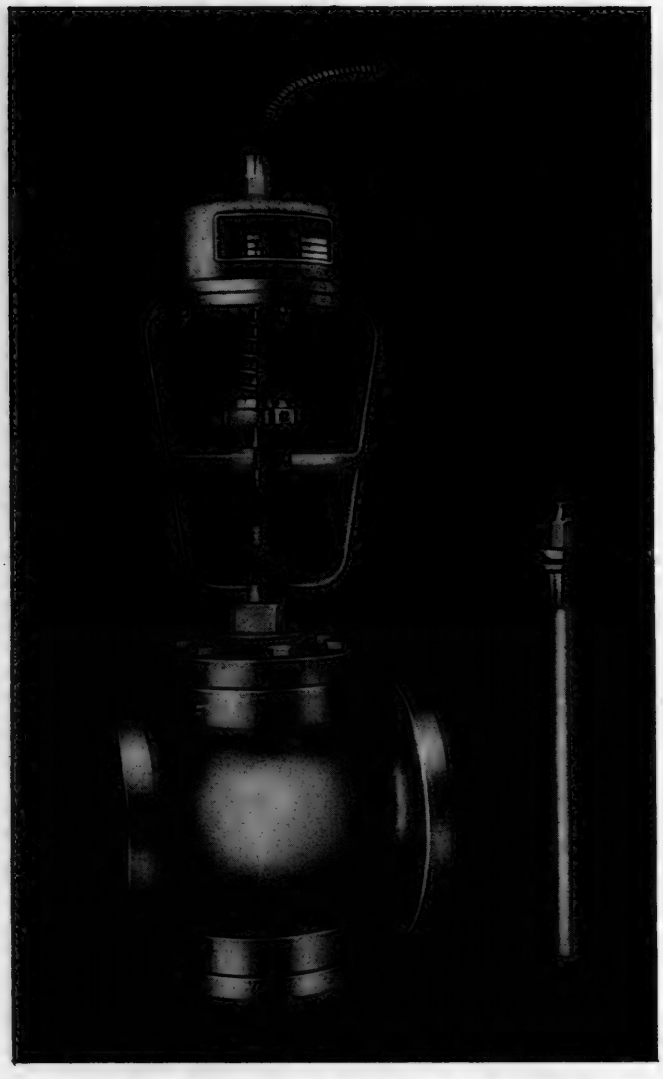
UR-1353

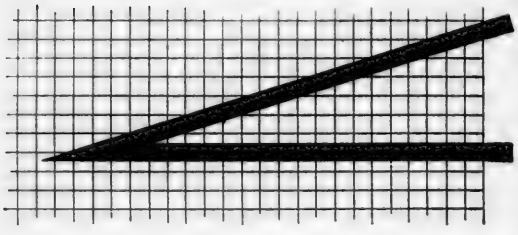
Modine MANUFACTURING COMPANY

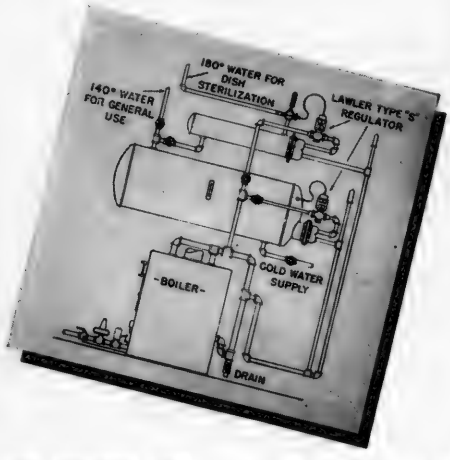
1511 DeKoven Ave., Racine, Wis.
In Canada: Sarco, Ltd., Toronto

INSTANT PROTECTION...

PRECISION CONTROL!







LAWLER TYPE "S" TEMPERATURE REGULATOR

DIRECT ACTING — Accurately controls all steam heating equipment. Protects against over heating . . . a rise in temperature above setting closes valve.

REVERSE ACTING — For cooling systems and recirculating lines. Rising temperature opens valve . . . drop in temperature causes valve to close.

THREE WAY — Mixes hot and cold liquids . . . delivers them at a constant pre-determined temperature.

ONE DEGREE OFF — up or down, and the Lawler Type "S" Temperature Regulator is in action . . . correcting to and maintaining the desired temperature.

Hydraulically formed bellows are non-ferrous, give "hair-line" control with instant response. Highly polished stainless steel valve stem provides friction-free operation for real rugged performance . . . longer lasting durability.

There's no job too tough . . . too unique for the Type "S". It's available in many variations for any special purpose. In industry, dairies, food processing, Diesel engineering . . . where ever steam, gases or fluids are used, the Lawler Type "S" Temperature Regulator will do an excellent control job for your customer.

PERFORMANCE TESTED FOR LONGER LIFE

Steam Temperature Regulators
Thermostatic Shower Mixing Valves
Water Controllers
Tempering Valves

DESIGNERS AND PRODUCERS OF THERMOSTATICALLY OPERATED VALVES SINCE 1895

THE *Lawler* Line of **Thermostatic Control Valves**

LAWLER AUTOMATIC CONTROLS, INC., MT. VERNON, N. Y.

Each B&W Integral-Furnace Boiler at Carling's Natick plant has a capacity of 58,000 lb of steam per hr at operating pressure of 150 psi and 200 psi design pressure. Plant designed by: Carling Brewing Company, Engineering Department, Cleveland. Architect: John Marshall, Canadian Breweries, Ltd., Toronto. General Contractor: Gilbane Building Co., Providence, R. I.

B&W Integral-Furnace Boilers Prove Reliability at Carling's

TWO UNITS ASSURE CRITICAL TIME CYCLING IN BREWING PROCESS

Carling Brewing Company's Natick, Mass., plant, the first new brewery in New England in more than 40 years, produces 600,000 barrels of Red Cap Ale and Black Label Beer a year. Steam for the brewing process, pasteurizing, sterilizing, and heating the plant is supplied by two B&W Integral-Furnace Boilers.

One Unit Alone is meeting the plant's maximum load of 35,000 lb of steam per hr, with the second on a stand-by basis. This boiler-room schedule is part of the plant's overall design, which will permit adding another 600,000 barrels of capacity when required.

After a Year of Operation, Lewis R. Grant, Chief Engineer, reports that the oil-fired boilers have given instantaneous response to load changes and are operating at high efficiency. There has been no maintenance necessary since the boilers went on the line.

Reliability Is Important at the Natick plant because of the exacting time cycling of the brewing process. The B&W units have easily met this test. The steam delivered has been clean and dry, with no indication of solids carry-over.

B&W Integral-Furnace Boilers, for any steam requirements up to 350,000 lb per hr and for all fuel conditions, incorporate installation, operating, and maintenance features that give greater boiler efficiency, availability, continuity of service, and overall economy. They provide maximum capacity in small space, high fuel economy, smokeless combustion, and economical, fast steaming. Completely integrated units, they are backed by the undivided responsibility of a single manufacturer, with nearly a century of steam generating experience. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

G-839-1B

BABCOCK & WILCOX

BOILER DIVISION

Sound-sealed, compact. Interior view shows full utilization of space which makes TRANE unit so trim. Note, too, how refrigeration equipment is virtually sealed away in its own independent compartment.

TRANE 10 and 15-ton deluxe air conditioners. Note dual refrigeration cycle using hermetic compressors.

Larger sizes, too. 10, 15 and 20-ton models with or without evaporative condensers. Delivered with all internal wiring and piping completed. As their heart, they have TRANE Reciprocating Compressors, famed for long life, easy servicing, with complete interchangeability of parts.

THE TRANE COMPANY, LA CROSSE, WIS. • EASTERN MFG. DIV., SCRANTON, PA.
TRANE COMPANY OF CANADA, LTD., TORONTO • 90 U.S. AND 19 CANADIAN OFFICES

So quiet you ca

Modern "Iso-Sound" design

Even if you're seated as near a TRANE Self-Contained Air Conditioner as the people in this picture—*you can't hear the compressor cut in!*

It's because TRANE has completely redesigned the usually noisy elements of packaged air conditioners to bring you whisper-quiet operation.

In the mechanical refrigeration section, specially designed parts reduce vibration, minimize noise.

Centrifugal fans are twice tested for quietness. Fan housings are *tight* to prevent noisy air leaks.

With new TRANE "Iso-Sound" design, both fan and compressor sections float independently on sound and vibration isolators.

can't hear it start !

compressor plus exclusive Trane assures smooth, vibration-free operation!

The result: the smoothest, quietest package unit in TRANE history. One you can confidently specify for clients who want *quiet* as well as *comfort*. And trim, slim beauty in cabinet design, too!

TRANE Self-Contained Air Conditioners are bringing *big system* performance to stores, shops and offices and factories all over the nation.

The complete TRANE line includes package units from 3 to 20 tons—other equipment to 1,500 tons—to handle any size or type of job.

For full data on the TRANE packaged line for 1957, call your nearby TRANE Sales Office or write TRANE, La Crosse, Wisconsin.

For <u>any</u> air condition, turn to

TRANE

MANUFACTURING ENGINEERS OF HEATING, COOLING, VENTILATING AND HEAT TRANSFER EQUIPMENT

Dunham-Bush acquires Brunner Mfg. Co.
The Dunham-Bush acquisition of the Brunner Manufacturing Company and its subsidiary, The Brunner Company, brings under one management the manufacture of well established lines of heat transfer equipment and accessories, as well as condensing units and compressors, to satisfy the requirements of the Air Conditioning, Refrigeration, and Heating Industry.
Close to $109,000 was spent
Two news services were initiated in 1956. The job
program for the retarded
the home care
added to the

What this means to YOU . . .

The combining of these two well established companies signifies greater things to come for our industry. Combined research facilities and enlarged staffs of skilled development engineers provide the means for continued advancements in new and improved products.

Our prime obligation is to serve the best interests of our rapidly growing industry — to assist in every way possible the realization of its full potential. Dunham-Bush, with the acquisition of Brunner, is better equipped than ever to fulfill that obligation. You can expect improved service and delivery on all our products . . . the assistance of our expanded engineering staff in solving your application problems.

We intend to prove to you that you benefit most when you entrust your air conditioning, refrigeration and heating orders to one source — one responsibility.

Thanks to our Dunham-Bush and Brunner customers for their continued cooperation.

Cecil Boling
PRESIDENT

Dunham-Bush, Inc.

DUNHAM-BUSH

WEST HARTFORD 10 • CONNECTICUT • U. S. A.

MICHIGAN CITY, INDIANA • MARSHALLTOWN, IOWA • RIVERSIDE, CALIFORNIA • UTICA, NEW YORK

SUBSIDIARIES

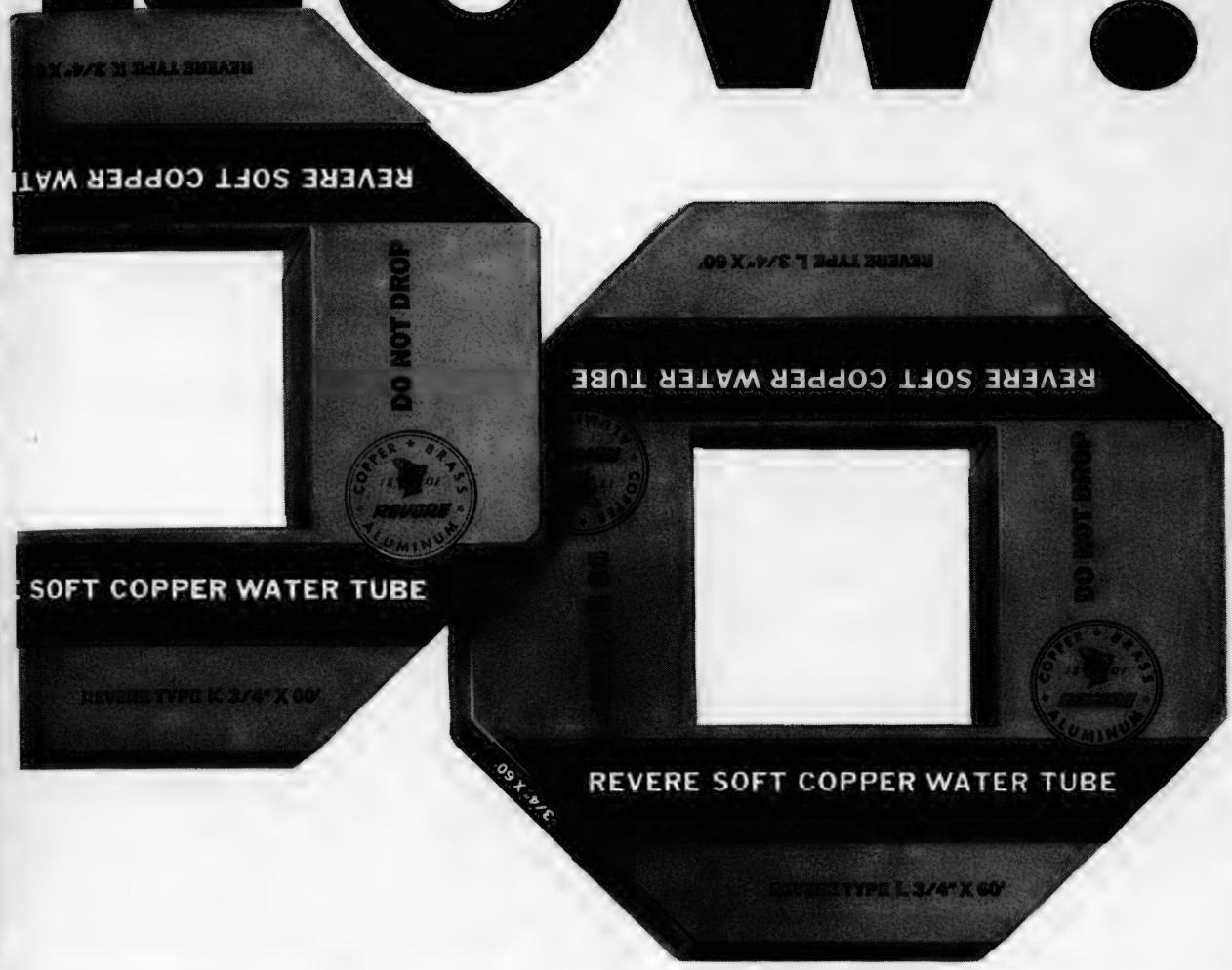
heat-x HEAT-X, INC. BREWSTER, N.Y.

DUNHAM-BUSH (CANADA), LTD. TORONTO, CANADA

BRUNNER THE BRUNNER CO. GAINESVILLE, GA.

DUNHAM-BUSH, LTD. LONDON, ENGLAND

NOW!



REVERE'S *COLOR-CODED* COPPER WATER TUBE PROGRAM INCLUDES THESE TWO NEW PACKAGES . . .

. . . for faster, positive identification, easier handling and stocking of "K" and "L"

First to color-code its straight lengths of Copper Water Tube, Revere again steps out in front by color-coding its coiled Copper Water Tube Packages.

So, from the time Revere "K" and "L" are received by you, until they are delivered to the job, fast, positive identification is assured, even where light is inadequate and help inexperienced. This speedy identification also simplifies taking of inventory, checking bills of lading and shipping tickets and double-checking against building specifications.

For a top quality water tube that's more convenient to use, identify and handle, make sure you specify "REVERE."

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

Mills: Baltimore, Md.; Brooklyn, N. Y.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Newport, Ark.; Rome, N. Y. Sales Offices in Principal Cities, Distributors Everywhere.

COPPER ★ BRASS ★ 1801 ★ REVERE ★ ALUMINUM

OO LITTLE ON TOO MUCH—

Get the "RIGHT SIZE" Brunner Condensing Unit for every Refrigeration job

Getting the right size equipment for the job is important!

Brunner offers a complete line of Open-Type and Semi-Hermetic Condensing Units, in a wide range of sizes, to fit every refrigeration or air conditioning installation.

And remember . . . the Brunner line is backed by a coast-to-coast net-work of over 200 Wholesaler Supply Depots.

Build more sales with Brunner in '57.

BRUNNER MANUFACTURING COMPANY, UTICA, N. Y.
THE BRUNNER COMPANY GAINESVILLE, GA.
In Canada: Brunner Corp. (Canada) Ltd., Toronto, Ontario

BRUNNER SINCE 1906

BRUNNER OPEN-TYPE Condensing Units from 1/4 H.P. through 100 H.P.
BRUNNER-METIC semi-hermetic Condensing Units available from 1/4 H.P. through 3 H.P.

BRUNNERIZE FOR DEPENDABLE REFRIGERATION AND AIR CONDITIONING

Shown with weather enclosure removed

PLUS VALUES... all yours in the Clarage Centrilator

POWER ROOF VENTILATOR — CENTRIFUGAL TYPE

Jet Siphon* feature for stable, high efficiency.

Static pressures to 2" — thus well suited to both light-duty installations without ductwork and applications where ductwork or hoods impose considerable resistance.

Adaptable to a wide range of motor sizes.

Variable pitch V-belt drive.

Wheel and inlet designed for streamlined air flow.

Built heavy-duty throughout to assure long-lasting, trouble-free service.

Every wheel statically and dynamically balanced on precision machines.

Inspection panel and complete accessibility.

Low overall height.

Venting of motor and drive area.

Engineered and constructed for extra quietness.

Heavy-duty anti-friction bearings.

Simple installation — only 4 bolts required.

Write today for Bulletin 550. Clarage Fan Co., Kalamazoo, Mich.

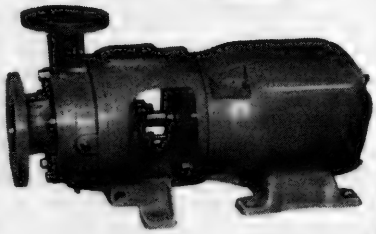
*Patent applied for

CLARAGE ... *dependable equipment for making air your servant*

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

● *Here's an example of dependable Motorpump service. This Ingersoll-Rand Motorpump was installed in 1948—and has been running ever since.*

Texas installation proves LONG LIFE, LOW MAINTENANCE OF MOTORPUMP



- *Sizes up to 75 hp*
- *Compact, space-saving*
- *Operate in any position*
- *Simple installation*

One of the big reasons why Ingersoll-Rand's Motorpump is specified as an integral part of so many air conditioning systems is its compact, rugged design and trouble-free operation. Motorpumps are built to give efficient, low-cost operation—and here is just one instance where performance paid off many times over:

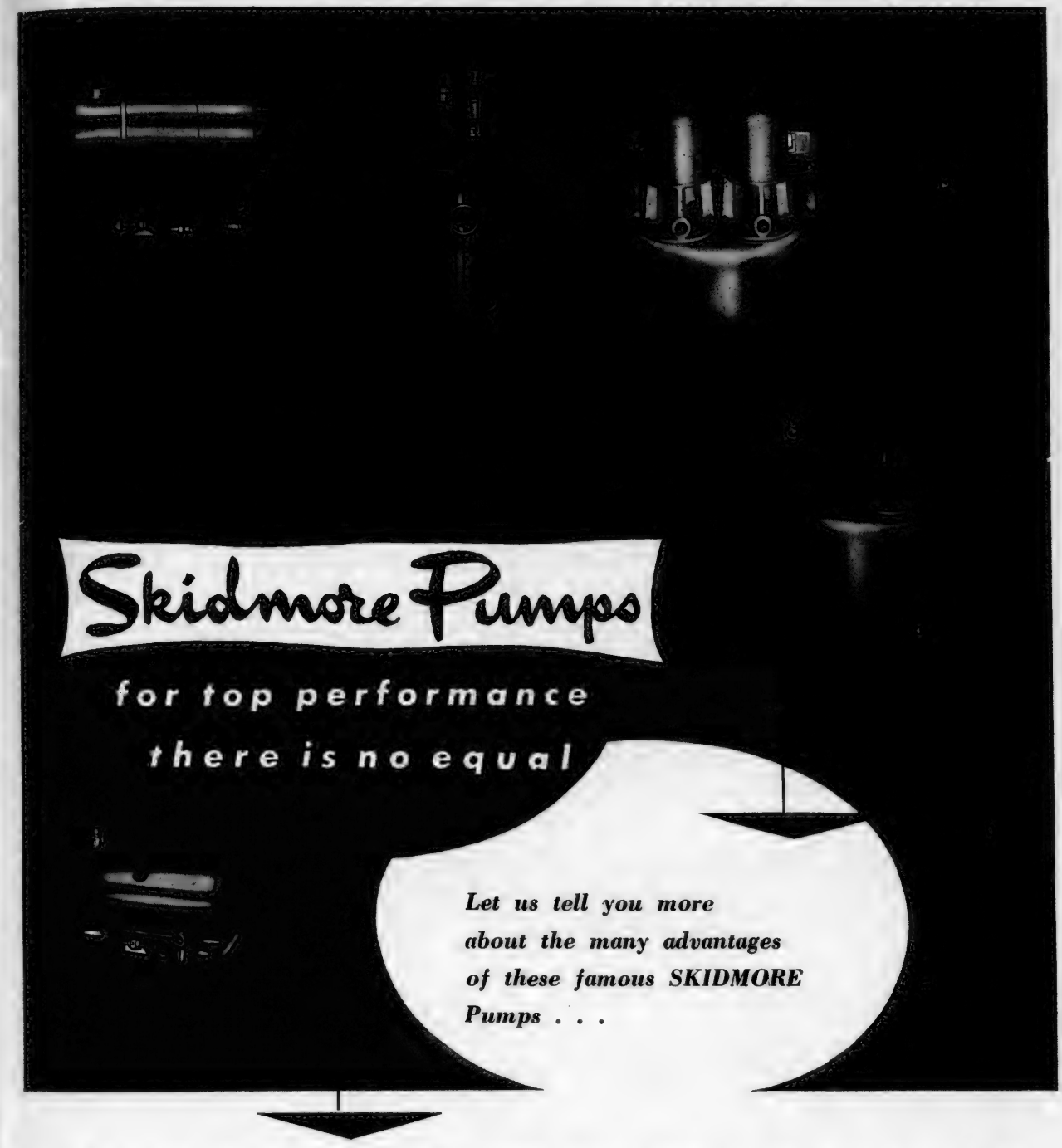
> The 1 hp, 3 phase Motorpump was installed in Corpus Christi, Texas in 1948 on a 5-ton air conditioning system. It has outlasted one compressor unit and one tower, and they've had to replace piping. Existing records and the pump's appearance indicate that there has been no maintenance. It is still in operation.

If you'd like other interesting examples proving the outstanding service advantages of I-R Motorpumps, get in touch with your nearby Ingersoll-Rand representative or write to Ingersoll-Rand, Cameron Div., 11 Broadway, New York 4, N. Y

Ingersoll-Rand

9-408

PUMPS · CONDENSERS · TURBO-BLOWERS · COMPRESSORS · ROCK DRILLS
VACUUM EQUIPMENT · AIR & ELECTRIC TOOLS



Let us send data—

Write us the type of Skidmore Pump you are interested in — we'll send brochure with full information.

- **Compact, modern design — but readily accessible for inspection.**
- **Built to every installation requirement — in single and duplex units, assuring maximum efficiency.**
- **Completely assembled in wide range of capacities — pre-tested and ready for immediate shipment.**

SKIDMORE PUMPS

SKIDMORE CORPORATION ST. JOSEPH MICHIGAN

With Youngstown Steel Pipe on the job new **Lamson & Sessions** plant gets dependable, life-time piping system

To keep pace with the growing demand for their complete line of industrial fasteners, Lamson & Sessions Co. are erecting this new, beautiful, highly functional plant on Cleveland's Tiedeman Road. Providing dependability and long life for the plant's all-important piping system will be tons of quality Youngstown Steel Pipe.

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'CRV' Console Unit

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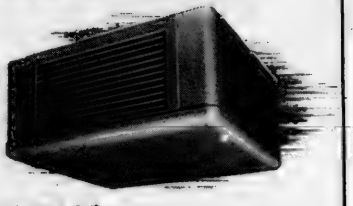

'CRH' With Cabinet

'CRV' Basic Unit

FLEXIBILITY... in Selection

Model	CFM Normal Speed	Water Coil Capacities		Inner-Fin Direct Expansion Combination Steam Coil	
		Cooling BTU/hr	Heating BTU/hr	Cooling BTU/hr	Heating BTU/hr
CRV-220 & CRH-220	220	5,600	18,300	6,400	15,300
CRV-330 & CRH-330	330	8,400	25,400	9,800	21,500
CRV-450 & CRH-450	450	13,200	35,300	14,900	28,000
CRV-600 & CRH-600	600	21,000	55,000	23,200	45,300

Cooling capacities (total heat) based on entering air 80° DB, 67° WB, 45° water (or 40° suction).

Heating capacities based on entering air 60°, 2 psig steam.

FLEXIBILITY... in Installation

Vertical models with cabinet can be exposed or semi-recessed, basic units completely recessed. Horizontal units with cabinet can be ceiling suspended in conditioned space; basic units can be utilized for unexposed installation.

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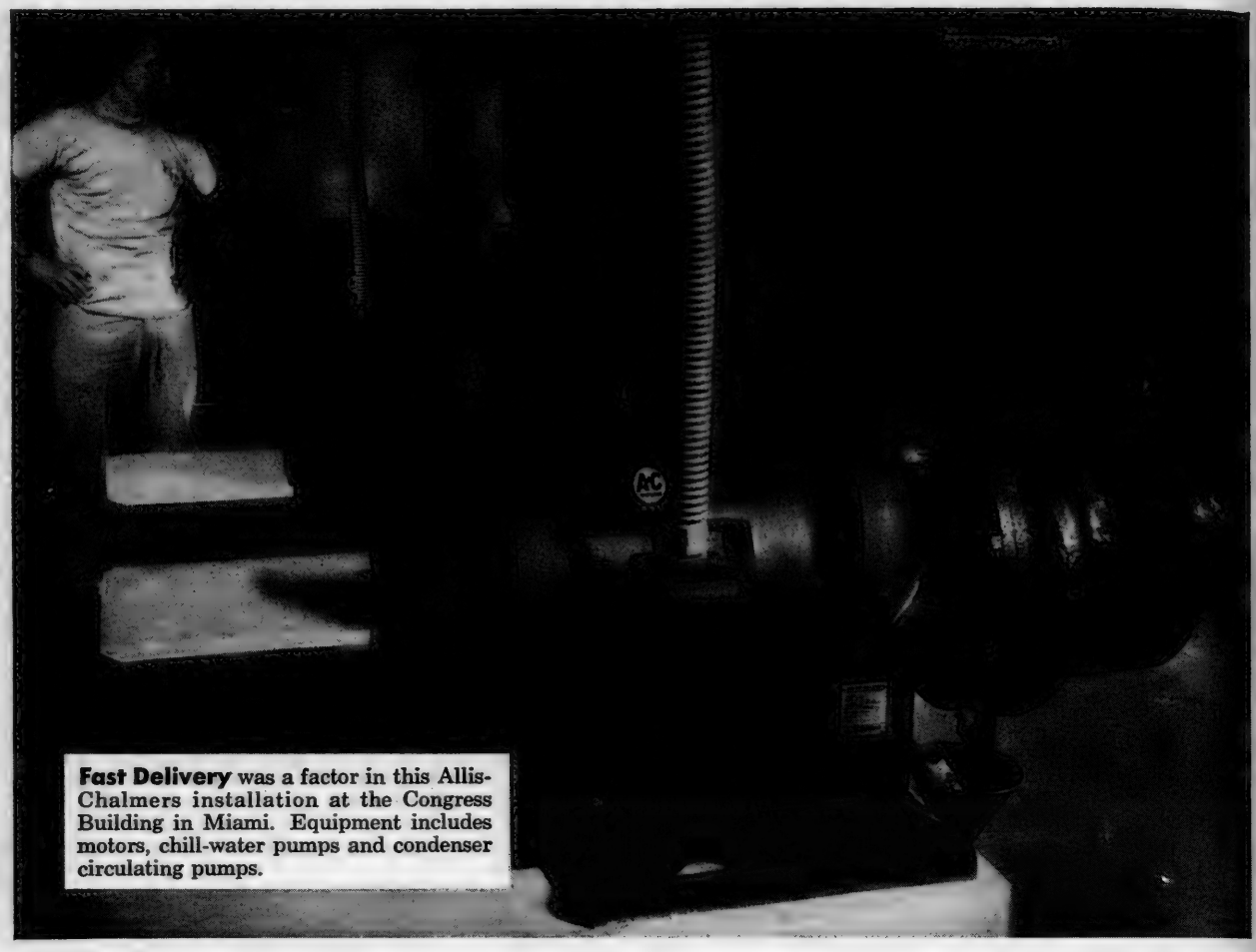

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Once you install Allis-Chalmers, your system has equipment known for its ability to keep going season after season. Unit responsibility means A-C pumps and motors are engineered to work together. Your customers are assured of staying cool and you slash service call-backs.

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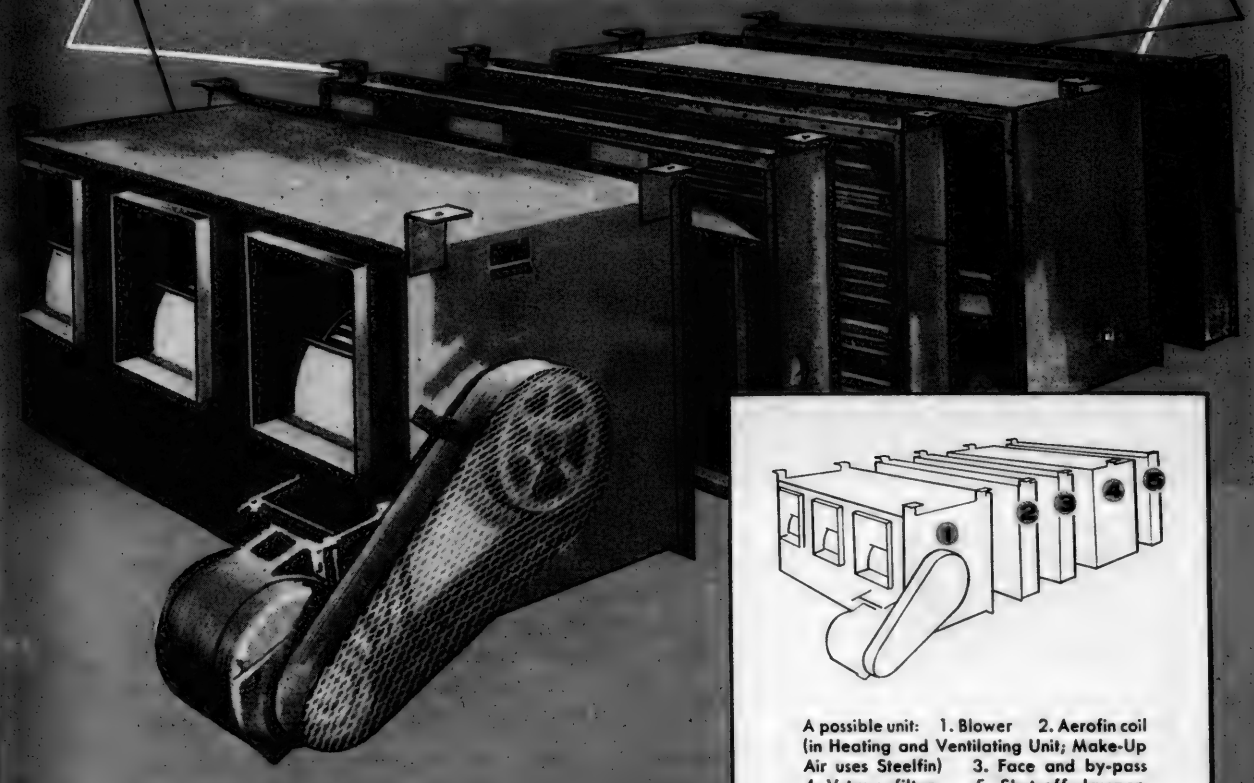

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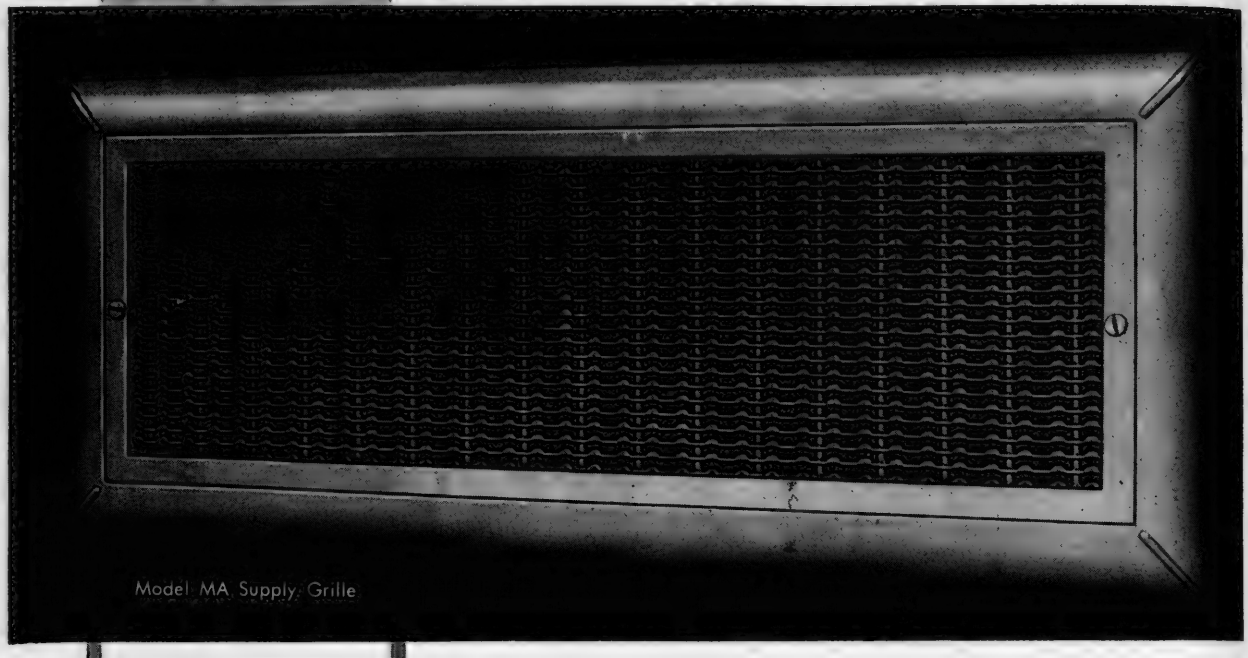

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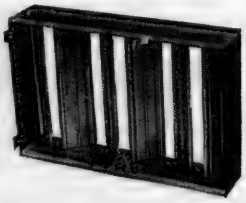
Model MF Return Grilles match the MA Supply Grille, above. A variety of frame styles in a complete line of both supply and return grilles provides continuity of appearance.



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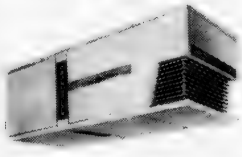

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200 psi	300 psi
Fig. 270-U, Bronze Wedge	Fig. 280-U, Bronze Wedge
Fig. 270-UN, Nickel Alloy Wedge	Fig. 280-UN, Nickel Alloy Wedge
Fig. 270-UL, Bronze Wedge, U.L. approved for L.P.G. Services	350 psi Fig. 280-UX, Bronze Wedge

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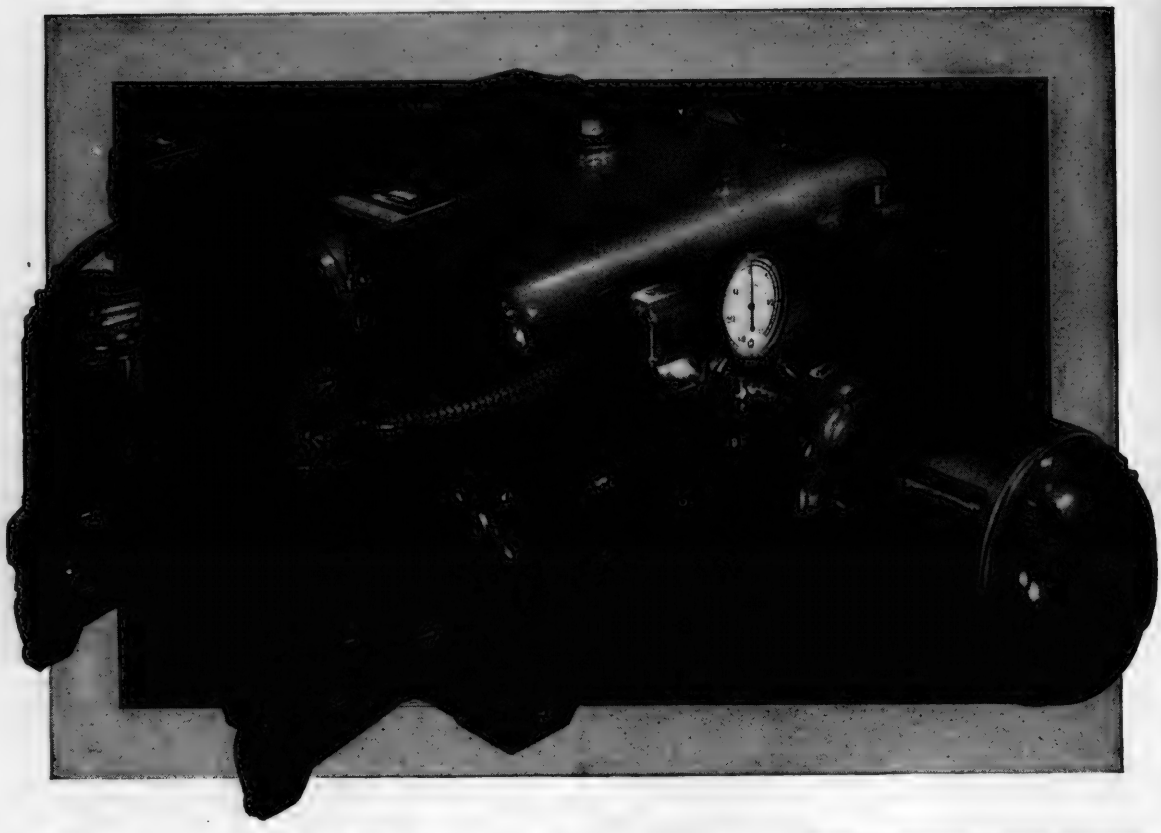

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- ✓ **Separate air and water pumps individually selected to meet actual job requirements.**
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- ✓ **Flexibility permitting addition of radiation without changing basic pump installation.**
- ✓ **Low, low, return line connection.**

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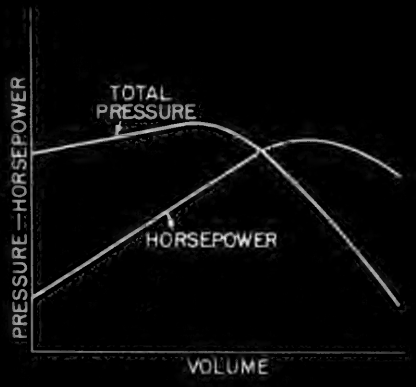
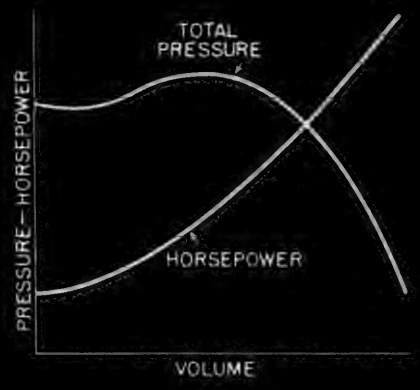
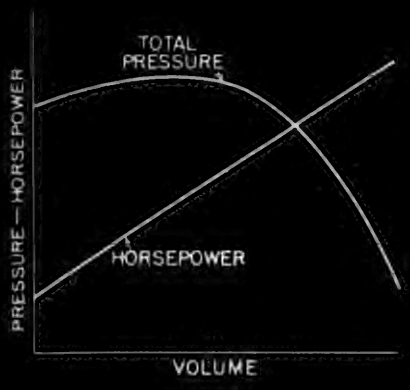






Selection of FAN TYPES

A. N. ROGERS

Sturtevant Division, Westinghouse Corp., Hyde Park, Mass.

The advantages and disadvantages of the various fan types are presented to help in the selection of the type most suitable for a particular application. With new research in fan design and the changing customer requirements, the entire picture may be altered within a few years and new selection concepts introduced.

THE primary problem in fan selection is to evaluate the types of fans commercially available in relation to application requirements. For any given service there is undoubtedly one type of fan best suited to meet the conditions. For example, there are three general types of centrifugal fans based on wheel blading. These are fans with forwardly curved, radial and backwardly inclined blading. Although the performance of individual fan designs by various manufacturers are not identical, the basic characteristics can be predicted and are determined by the wheel blading type.

Forwardly Curved Blading

Basically, forwardly curved type of blading is designed to increase the velocity component of the air leaving the tip of the wheel beyond the rotational velocity. Thus, this wheel builds up a large velocity or a high portion of kinetic energy. The diffusion space in the scroll or housing is employed to convert this velocity into pressure or useful potential energy. The transformation of kinetic energy into pressure is at best a difficult and inefficient process.

The theoretical design characteristic of this type of blading is such that the pressure would rise continuously as the volume increases. At the individual design point, that is, the area of maximum efficiency, this characteristic is evident as shown in Fig. 1. As the volume increase, the blading reaches a stall point where the air is no longer able to follow the contour of the blading. Beyond the maximum efficiency point, the pressure characteristic begins to drop off. Because the pressure tends to increase with the volume, the horsepower characteristic curves rapidly upward reaching a high peak at wide open volume. The characteristic dip in the region of blocked tight, is caused by the inefficiency at the lower volume conditions.

Because of this dip in the pressure curve, fans with forwardly curved blading have been called characteristically unstable. Assuming proper fan design however, this type can be perfectly stable in operation even in the region of the dip. In many instances, it is the system on which the fan operates that determines the ultimate stability of operation. If we had a system which followed the fan curve in the portion where it was rising with the volume increase, there would be hunting and instability of operation. But this type of system would be very exceptional. Most normal system characteristic curves would cross the fan curve at a sharp angle especially where the fan pressure is at a peak.

Stability of operation depends to a large extent upon the response characteristics of the system. In theory,

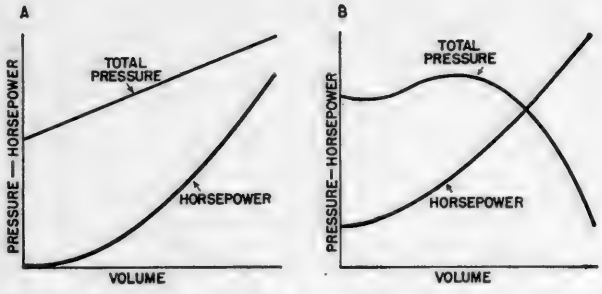


Fig. 1. Characteristics of forwardly curved blading. At A is the theoretical curve, and B, the actual curve.

the system resistance curve limits the fan to a single point of operation. If the volume increases, the system resistance increases, and conversely if the volume decreases, the system resistance decreases. In practice, however, a system may be made up of long runs of duct work or a plenum space that would show a response lag. This means that a momentary increase in volume can occur before the pressure rises to a compensating point. Following this, there would be an over-compensation again ot the pressure increase which would tend to reduce the volume. In this manner, surging or pulsation can be set up. This pulsation is not limited to forwardly curved blading, but is possible with any fan type operating on the blocked tight side of the pressure peak. The dip in the pressure curve characteristic of forwardly curved blading however, can often serve to magnify the problem.

Where quick response resistance such as filters, coils or straighteners are located in close proximity to the fan and make up a major portion of the total resistance, the tendency toward pulsation is minimized.

Parallel Operation

At this point a word might be said about parallel operation. It is a well-known fact that the dip in the pressure curve is a serious drawback to parallel operation when fans are operating at peak efficiency. When fans are individually motored, it is possible to have one fan carrying more than its share of the load and the other fan much less. In unitary equipment, however, where two fans are running on a single shaft, this problem is not as serious. The over-all output will not vary too far from the design conditions even though the fans are unequally loaded and the combined horsepowers will not normally overload the motor. When the air from the two fans is carried in individual ducts for a distance before joining, the imposed series resistance will help to stabilize operation at the design conditions. Under most conditions, unitary equipment is not operated at the maximum fan efficiency and where the pressure curve falls off with increased volume, there is no question but what the fans will operate successfully in parallel.

Another popular misconception about the forwardly curved blade type is that it is inherently a large volume or high capacity fan. An examination of the fan characteristics, however, will show this just is not true. A fan of high volumetric capacity would have its peak efficiency well out toward the wide open volume condition. It would also be desirable to have high efficiency at low pressures. With the characteristic increase of pressure with larger volume flow with forwardly curved blading, this cannot be possible. The fan has a high capacity pressurewise but as the pressure begins to drop off, the inefficiencies build up and the design characteristics are lowest. These facts are readily apparent in the catalog data of forwardly curved bladed fans for heating and ventilating applications. Size for size, the peak efficiency is perhaps at a slightly large volume to prevent selection in the range where stability may be questionable, but in general, their useful medium efficiency range is the same as for other fan types. This fan type can, for a given size, produce a tremendously large volume out toward wide open but at very low efficiency, and is due in part to its characteristically low speed.

One of the characteristics of the forwardly curved bladed fan is that the scroll can be wrapped more tightly around the wheel than other fan types. This is due to the direction of the velocity component leaving the wheel and it enables the fan to have a comparatively small casing size for the size of the wheel. Because the pressure builds up rapidly, the rotational speed required for a given duty is very low. The wheel design with its multiplicity of small blades set close to the rim of the wheel allows for light weight construction. This combination of features offers advantages for various types of applications.

Small Space Needed

The small casing allows the fan to be used to advantage when space requirements are extremely small. Notable examples are its use in unitary equipment such as air handling units, air conditioning packaged units and furnace fans. The light weight and low rotational speed of the wheel enables the use of smaller shaft and bearings and becomes particularly advantageous when two or more fans are operated on a single shaft such as in air handling units or industrial heaters. Again, the low rotational velocity at high pressures makes it well suited for high pressure applications, such as induced draft, where its small size and low initial cost show up to advantage. The high velocities across the face of the blades preclude its use when erosive material is present in the air stream.

In its application for commercial heating and ventilating service, the story is quite different. It is economically impractical for most fan manufacturers to offer more than one complete fan design for this type of service. Because of the popularity of the backwardly inclined bladed fan in this application, the over-all fan is

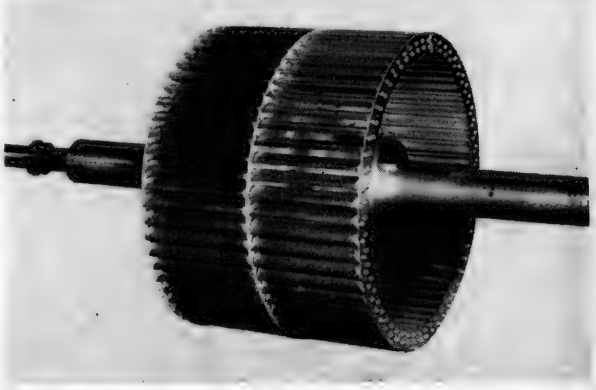


Fig. 2. A typical wheel with forwardly curved blading.

designed to use the backwardly inclined blading. However, it was discovered that a forwardly curved bladed wheel could be used in this type of housing without seriously effecting the efficiency. Because of the necessity for standardization in manufacture, the inherent advantages of the forwardly curved bladed fan have been sacrificed in commercial production. The over-all size, the individual components, except the wheel and inlet, and the resultant price is generally the same as for the backwardly inclined bladed type.

A typical wheel fitted with forwardly curved blading is shown in Fig. 2.

Radial Blading

Radial type blading was probably the earliest type developed and is exemplified by the early paddle wheel types. Present-day modifications include radial tip blading. The theoretical characteristic of the pressure curve would show a constant pressure regardless of volume flow. In practice again, the air will not follow the blading as volumes increase and the pressure curve is reduced at the larger volumes, Fig. 3. The horsepower would theoretically rise in a straight line as the volume increases. In practice, the horsepower characteristic is very close to the theoretical.

The theoretical design of the casing would be larger than with the forwardly curved blading type but in practice, due to the casing width-blade width ratio, this is not always the case. To the present, the maximum static efficiency for this type of blading has been about 70% and there seems to be no immediate trend towards its increase. One of the major advantages to this type of blading is that the blading stresses are essentially radial which enables this type of wheel to be designed for high speeds. This is especially true in wheels without side plates because the hoop stress in the side plates is the limiting factor in the tip speed, and therefore, the pressure developed. This characteristic makes it a popular blading choice for centrifugal compressors. The flat pressure characteristic is also often desirable in centrifugal compressor design enabling such a machine to handle a range of volumes at practically constant pressure.

The pressure characteristic of radial blading is inherently stable and shows only a minor reduction from the peak pressure at the blocked tight condition. This type of blading will operate successfully in parallel at the highest efficiency.

The other desirable characteristic of radial bladed fans is the self-cleaning action of the air sweeping over the blades thus preventing material build up. This makes

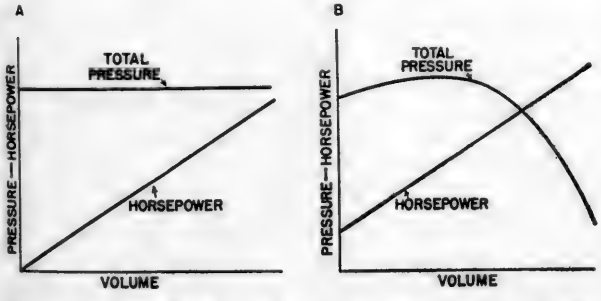
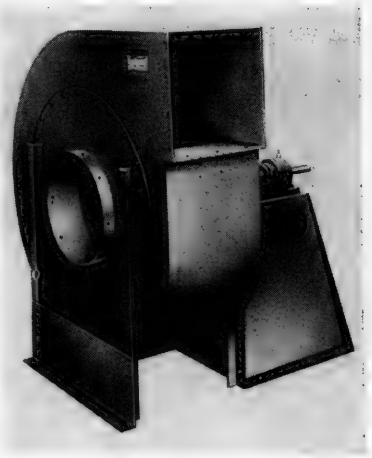


Fig. 3. Characteristics of radial blading. At A is the theoretical curve, and B, the actual curve.

Fig. 4. Industrial fan employs radial blading for material conveying.



such fans ideal for material handling and other types of dirty air application.

An industrial fan employing radial blading for use in conveying material is shown in Fig. 4.

Backwardly-Inclined Blading

Backwardly inclined bladed fans, the most recently developed type, have become increasingly popular for general application since the early 1920's. The theoretical pressure curve would be a maximum at the blocked tight condition with the pressure decreasing in a straight line as the volume increases. Except for the

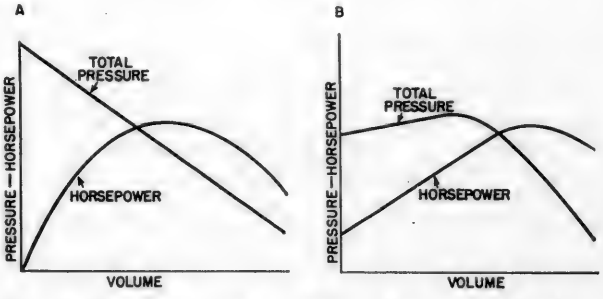


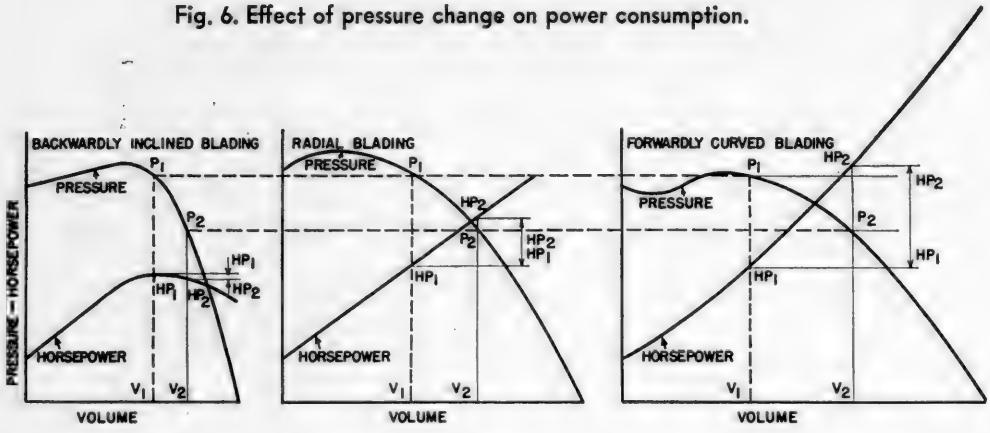
Fig. 5. Characteristics of backwardly inclined blading. At A is the theoretical curve, and B, the actual curve.

area close to blocked tight, the actual characteristic follows the theoretical quite closely, Fig. 5. The horsepower characteristic curves downward as the volume approaches wide open—in both theory and practice. Because this blading type follows more closely the natural path of the air through the fan, there is a tendency for the air to follow the blading quite closely even at the higher volume conditions. This enables the design point to be closer to the wide open volume condition and the efficiency holds up quite well in the high volume range. Due to these facts, the backwardly-inclined bladed fan can be said to have a higher volumetric capacity than forwardly curved or radial blading.

The velocities leaving the blade tips are low and most of the pressure increase is brought about in the wheel itself. This apparently is one of the big reasons why, in practice, the efficiency of this type of blading is considerably higher than the other types.

One of the disadvantages of this type of blading is

Fig. 6. Effect of pressure change on power consumption.



that the theoretical scroll is very large although in commercial designs the size has been reduced by widening the casing with respect to the wheel diameter. Thus with the backwardly-inclined bladed fan, the casing width is generally much wider with respect to the tip of the fan wheel than is the case with the forwardly curved bladed type.

Another disadvantage of this type of blading is that, because the spin velocity of the air leaving the wheel is low, the rotative speeds must be high. This imposes rather high stresses on the blades themselves due to centrifugal force. The wheel construction is necessarily heavy in compensation. The combination of the heavy wheel and high rotative speeds requires heavy shafts and bearings to keep the operating speed below the critical speed. This construction is of course expensive thus making the initial cost of this type of fan comparatively high.

The pressure characteristic of backwardly-inclined blading is well adapted to parallel operation. The horsepower rises to a peak in the vicinity of maximum efficiency and drops off at larger volumes. In fan selection this means that if the system resistance is less than the design estimate, the fan motor will not be overloaded. In contrast, the radial bladed fan would require a moderate horsepower increase and the forwardly curved bladed fan would require considerably more power. The motor will be overloaded if the design estimate is not close to the actual condition. This is illustrated in Fig. 6. In this graph P_1, P_2 and V_1 are equal for all fan types. Except for efficiency difference, HP_1 is approximately equal for the types shown.

A heating and ventilating application with backwardly-inclined blading is shown in Fig. 7. The forwardly-curved bladed fan and the backwardly-inclined bladed fan are generally a standoff as far as price and size are concerned. Size for size, in present-day designs, the backwardly-inclined bladed fan will be more efficient and thus require less power to operate. There is an additional bonus of the non-overloading horsepower characteristic of the backwardly-inclined bladed fan which will compensate for the inaccuracies normally encountered in calculating the system resistance.

Much has been said about the relative noise level of forwardly-curved versus backwardly-inclined blading. Considerable testing has been done to try to come to a final conclusion but present results indicate that again the two types are actually a standoff. Contrary to previous thinking, even the predominant frequency of the noise from both types has been found to be in the low frequency range.

Airfoil blading is a modification of backwardly-inclined blading and is a comparatively recent innovation on a commercal scale. With the streamlining of the blade contours, the air is able to follow the contours of the blading more closely. This results in high efficiency and quieter operation but the volumetric capacity is reduced to some extent. This type of blading is adapted to higher pressure applications both from a power evaluation standpoint and the strength standpoint. The double surface of the airfoil blading is stronger than a flat blade or a curved single surface. This enables fans to operate at higher peripheral velocities and for the first time enables the high efficiency of the backwardly-inclined bladed wheel to be adapted for centrifugal compressor applications.

Axial Flow Fans

In recent years, the development of axial fans, Fig. 8, has accelerated at an unprecedented rate. Although the design potentials are too involved to permit detailed ex-

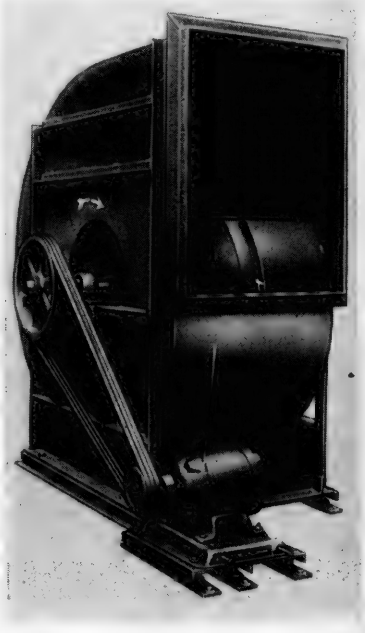


Fig. 7. Heating and ventilating fan with backwardly inclined blading.

planation here, it is sufficient to say that axial flow types can be developed to suit most applications. At present the axial flow design is noisy as compared to centrifugal fans but the future may eliminate even this drawback. Its potential, in the very high capacity range, far outstrips that of any centrifugal type and for this reason it is well adapted to clean-air industrial applications where noise is a relatively minor consideration. Its compact design and simplicity of mounting and erection make it a good choice whenever conditions will permit its use.

Summary

The forwardly curved blading type is well adapted for high pressure applications, particularly in mechanical draft work, and can be used when space requirements are limited as in unitary equipment. The efficiency is not outstanding and its ability to operate in parallel is limited to volumes beyond peak efficiency. The radial bladed fan is adapted to material conveying and other applications where material must pass through the fan itself. The inherent strength of the radial blade design is excellent for centrifugal compressors and other types of high pressure fans but the efficiency is only medium. The backwardly-inclined bladed fan in commercial form is undoubtedly the best for heating, ventilating, air conditioning and general industrial applications. Efficiency is the best, the pressure characteristic is good, parallel operation is no problem, and the non-overloading horsepower characteristic allows leeway in system design. Airfoil blading can be used for high pressure applications and the efficiency and quietness of operation are even better than the flat bladed fan. Axial flow types are excellent for large volume, low pressure, clean air duties where higher noise levels are relatively unimportant.

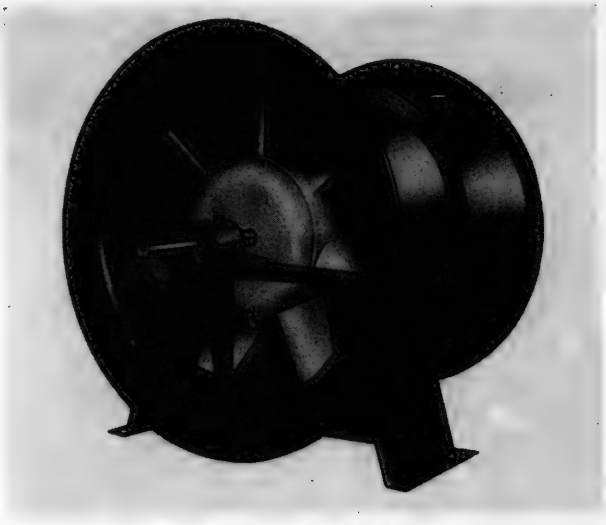


Fig. 8. Typical axial flow fan.

Studies in the Use of Solar Energy

Residential space heating may become the first major use of solar energy in the United States. Comfort cooling by means of solar-heat-operated refrigeration units also has an attractive potential as a use of the sun's energy.

These and other applications of solar energy are discussed in an article, "Realities of Solar Energy" by James A. Eibling, appearing in the March issue of the *Battelle Technical Review*. In addition to mentioning several uses of solar energy, Eibling discusses the economics of and needs for solar energy, as well as techniques for utilizing that energy.

Economic analysis points to large increases in energy requirements as both the population and the per capita energy consumption grow. In the long run, large-scale electric power generation will probably be most feasibly produced with nuclear energy, according to the Battelle technologist. On the other hand, power for the country's transportation system comes entirely, at present, from mineral fuels—gas, oil, and coal. Economy suggests that declining reserves of these fuels might best be kept for use primarily in transportation. Residential heating, currently one of the large users of these fuels, might be shifted, in part, to solar energy, which is best suited to small, immobile installations, such as houses.

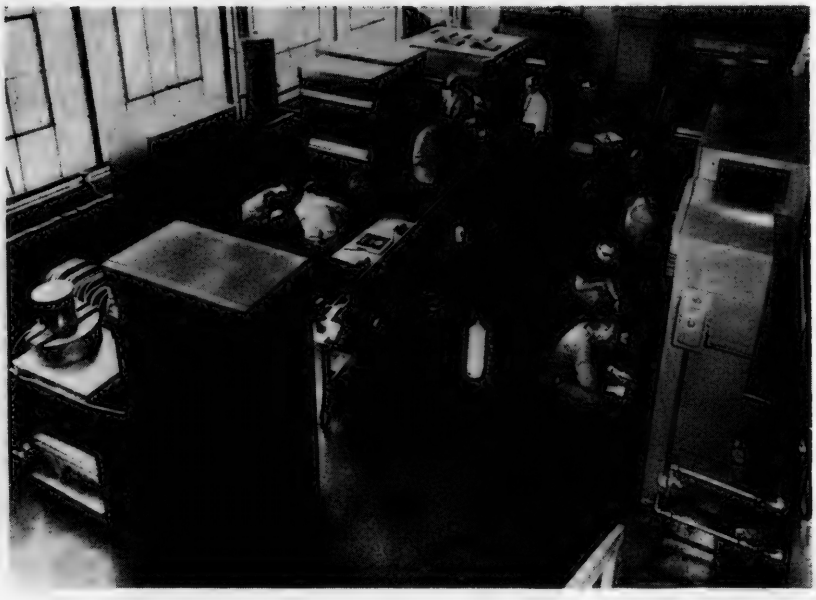
"For most parts of the United States," the author states, "sufficient solar energy could be collected on the roof of a well insulated, flat-roof house to meet the combined requirements of space heating, space cooling, and hot-water heating—if we can find an economical way to store heat for periods as long as several weeks." Eibling points out that thinking need not be geared to the all-solar-heated house. Rather, solar energy might provide the bulk of heat requirements and be supplemented with electric heating at times of peak load.

Other possible uses of solar energy might be: Domestic refrigeration, water pumping, power generation (up to 10 hp), and service as a heat source for heat pumps.

"Efficiency in itself is not necessarily the most important criterion for evaluating solar devices. It is significant mainly in that it affects the area and consequently the cost of the collector needed. For applications in non-industrialized communities, however, simplicity of design and operation and minimum maintenance may be more important than high efficiency. In non-industrialized arid regions, the performance of simple tasks with solar devices will help raise living standards."

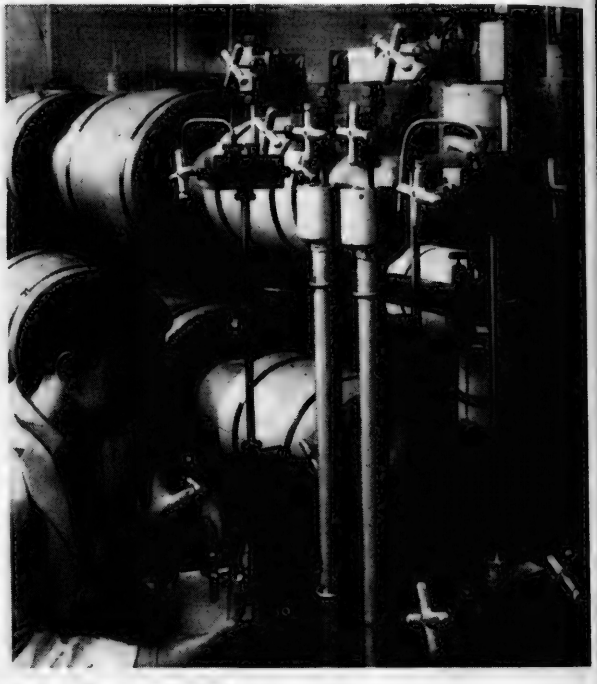
Energy storage is, to Eibling, one of the most momentous research challenges in the field of solar energy utilization. Another major field of fruitful research would be study of techniques for using solar energy—the fundamental physics and chemistry involved in the reactions between photons (light energy) and molecules.

"If we wish to speed the day when solar energy will be competitive on a broad basis, much research will be needed," Eibling concludes. "This work should include fundamental investigations into the basic reactions of photons with molecules as well as applied research in heat transfer, chemistry, metallurgy, mechanics, and solid-state physics. The manufacture of low cost, efficient devices for trapping and utilizing the sun's energy and inexpensive dependable systems of storing energy can be listed as important end-products of the research."



TRAINING SCHOOL. A unique feature of the American Blower Commercial Air Conditioning Training School is that registrants need not be representatives of an American Blower dealer or distributor to qualify for admittance. The school's laboratory facilities are complete, including units ranging from 3 to 20 tons, water tower, and work area for equipment service functions. Admission to the school is by application to American Blower Div., Detroit 32, Michigan.

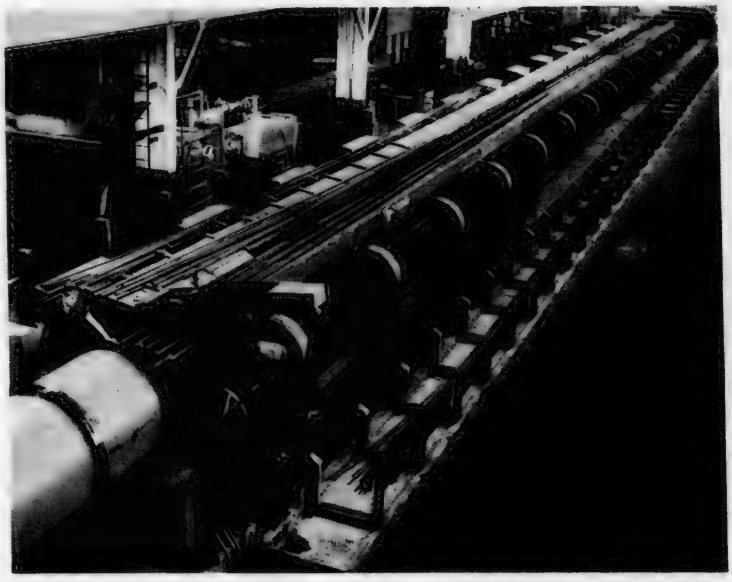
Picture Paragraphs



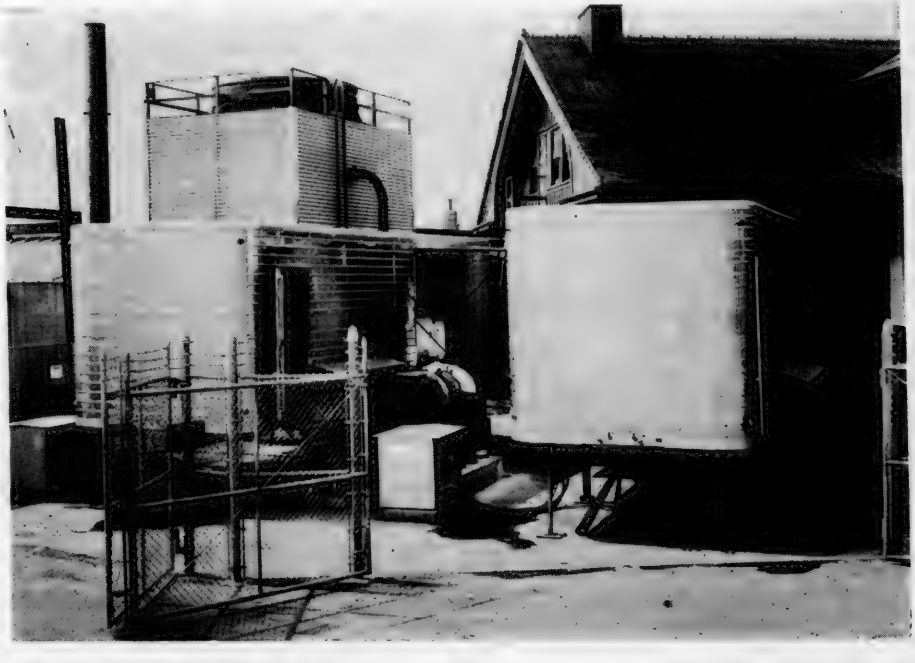
CORROSION TEST LOOPS. To help speed the development of peacetime atomic power, Westinghouse Electric Corporation engineers have placed in operation two experimental material test loops. Each of the test loops consists of a system of stainless steel pipes containing a fluid which is pumped past test specimens placed in the system. Chemicals added to the fluid vary its corrosive potential; temperatures up to 600 deg F, pressures up to 2000 psi, and velocity of fluid are closely controlled to simulate conditions existing in atomic power plants. Purpose is to study corrosive effects of hot, pressurized fluids on structural materials to guide design, manufacture of atomic power equipment.

ELECTRONIC BALANCING MACHINE. To insure quiet operation and vibration-free performance of its fans, The Trane Company uses this electronic device to obtain hairline dynamic balance. With this sensitive apparatus, wheels weighing over half a ton are balanced to a tolerance of less than one ounce.

WORLD'S LONGEST TUBE DRAWBENCH. The world's longest tube drawbench for the brass and copper industry was installed recently in the Cleveland Mill of Chase Brass & Copper Co. The machine is 400 feet long and will draw 5 tubes at a time to a maximum length of 210 feet, operating at speeds varying between 110 and 330 feet per minute, depending on size of tubes being drawn. Powered by a 500 hp motor, a dual draw chain with ultimate tensile strength of 100,000 psi imparts the 150,000 lb load.



ISRAELI WATER-WORKS ENGINEER. Moshe Nave, Israeli water-works engineer, on left, is being trained at De Laval Steam Turbine Co. plant in Trenton, N. J., in the latest techniques of installation, repair, and maintenance of water-works pumps. Israel, largely dependent on water from deep wells for agricultural, domestic, and industrial uses, has over 500 deep-well pumps in operation. Mr. Nave directs 12 field crews of the Mekoroth Water Co. in Israel. Pictured with him is M. M. Cameron, manager of De Laval's plant in Calgary, Alberta, Canada.



HOT WEATHER AN ALSO RAN. These two trailers housing the world's largest portable air conditioning system will make club house patrons of the Balmoral thoroughbred racing season comfortable this summer at Washington Park in Chicago. The system, designed by Robert Hattis Engineering Co. of Chicago, and built by the York Corporation, subsidiary of Borg-Warner, is based on two high-speed turbomatic compressors. Refrigeration equipment produces equivalent of 1500 tons of cooling and has air handling capacity of 400,000 cfm, enough to handle easily the 200,000 sq ft area to be air conditioned at the race track.

Calculating the Heat Requirements of a Snow Melting System

Part 9—New England Region

WILLIAM P. CHAPMAN

This is the ninth article of a series which will eventually cover all parts of the U.S. where snow melting systems are likely to be used. The first article summarized the basic equation for heat required for snow melting and defined the free area ratio as the ratio of slab area free of snow to total slab area. In order that each installment of this series can be understood, both the classification of systems and an explanation of the four tables are repeated.

THE total heat output of a snow melting system depends on the rate at which it melts the snow, and this rate in turn depends on the relative importance of rapid snow removal among the different types of applications. Snow melting systems can be classified as follows:

Class I (minimum): Residential walks or driveways and interplant areaways;

Class II (moderate): Commercial (stores and offices) sidewalks and driveways and steps of hospitals; and

Class III (maximum): Toll plazas of highways and bridges, and aprons and loading areas of airports.

These classifications depend upon the allowable rate of snow melting. For example, a residential system does not have to melt snow as rapidly as a commercial system. In fact, a depth of snow of an inch for an hour or so during a heavy storm might not be objectionable with a residential system. On the other hand, a store manager would claim the system was inadequate if half an inch accumulated on the sidewalk in front of his store. The difference, then, between a Class I system and a Class II system is in the ability of each system to melt snow. The one feature that is common to all classes is that the systems must be adequate for some combination of weather factors. Or, the designer wants to be able to say that he

will pay to melt snow whenever conditions are milder than some critical value but he is willing to have an inadequate system for a given fraction of the time. In other words, the designer will run a calculated risk providing he knows the odds of that risk. For a residential system, where initial cost must be at a minimum, the designer must accept more frequent snow accumulations.

Naturally, the owner is not concerned about an explanation of why there is an accumulation of snow on the sidewalk. It is immaterial whether the accumulation is due to excessive snowfall or whether it is due to an extremely cold snowfall. In both cases, the ultimate reason is that an inadequate flow of heat is reaching the surface. The true analysis of heat output, then, depends on an analysis of the weather. This is true of all three system classes.

The total heat requirements of a snow melting system are determined, therefore, by (a) the total area of the snow melting slab, (b) the rate at which the snow is to be removed, and (c) the values and frequency distribution of each of the pertinent climatic variables (humidity, wind, temperature, and snowfall). Obviously (c) varies from city to city and, due to the complexity and number of calculations to obtain a frequency distribution of the four variables, the evaluation of (c) has been virtually impossible. However, by the use of punched cards and statistical tabulating machines, data have been derived so that the heat requirements for a given city can be simply presented.

The designer needs two types of information. First, the most severe combinations of variables on which to base his *design output*, and second, the heat required over the season so that *operating costs* can be determined. These data are given in Tables 1, 2, 3, and 4 which follow and which cover three cities in the New England region of the U. S.

TABLE I—GENERAL INFORMATION ON SNOWFALL, NEW ENGLAND REGION

Item	Hartford, Conn.	Boston, Mass.	Falmouth, Mass.
Approximate mean number of days with an inch or more of snow on the ground	65	70	30 (with trace or more)
Average number of inches of snowfall per year	40.5	42.5	21.2 32.4[x]
Great snowfall in 24 hours, inches	19.0	16.5	15.0[x] 20.1[†]
Greatest depth of snow on the ground, inches	32.8	23.0	18.2[x] 23.0[†]
Mean number of days per year with snowfall of 1 inch or more	11	10 (42 with trace or more)	35 (with trace or more) 42[x] (with trace or more)

[x]For Providence, R. I.
[†]For Nantucket, Mass.

Table 1

The first table gives some generalized information on snowfall and snow on the ground. The next to last item, "Greatest depth of snow on the ground" indicates the greatest depth to which snowfall has ever accumulated. Other items are self-explanatory.

Table 2

Table 2 contains the operating information of a snow melting system. For freezing temperatures (32 deg and below) but no snowfall the system may be "idling." That is, the designer may want to supply some heat to the slab so that there will be immediate melting when snow starts to fall. The column on mean temperature gives the average temperature during *freezing* temperatures. This temperature is used in calculating the "idling" load. The other term needed to calculate idling load is the wind velocity during the period of freezing temperatures.

The column "Hours of Snowfall" indicates the number of hours that snow is falling at rates equal to or greater than 0.01 inch of water equivalent per hour. Roughly speaking there are snowfalls of "trace" quantities about twice as often as there are for measurable quantities of 0.01 inch or more. It is assumed that these light falls can be handled by the idling load.

The remaining columns of Table 2 represent the frequency distribution of required heat output. This distribution is based on the solution to the basic equation for two values of the free area ratio A_r. This distribution represents the heart of the analysis and is also the basis for Tables 3 and 4.

Table 3

Table 3 contains the *design* heat requirement—as explained in the footnotes to Table 3. These design rates may be altered by the designer if he feels that a particular job should have a different design criterion from those given in the footnote. Any change in design selection should be based on the frequency distribution given in Table 2.

Table 4

Table 4 contains the data required to estimate the operating cost of a snow melting system. The footnotes to Table 4 explain the various items.

Use of the Tables

Example. Make a recommendation for the size of a heat exchanger for a 20,000 square foot sidewalk around a department store in Boston.

Solution. Normally, a sidewalk system would be served adequately with a Class II system. It would in Boston, too. Here, though, there are extenuating circumstances. A Class II system requires a heat exchanger capable of supplying 231 Btu per (hr) (sq ft) of sidewalk whereas a Class III system needs just 10% more or 255 Btu per (hr) (sq ft). Look, too, at the annual operating cost—almost identical. Surely, then, there is little advantage in using a Class II system. From Table 2 it can be seen that a system with less than 200 Btu per (hr) (sq ft) would fail on the average of once a year.

Bearing these facts in mind it seems logical to select a Class III system. Generally the matter of edge losses is slight for a sidewalk around a department store. Very often there are vaults or even sales areas beneath the

TABLE 2—DATA FOR DETERMINING OPERATING CHARACTERISTICS OF SNOW MELTING SYSTEMS IN THE NEW ENGLAND REGION[1]

Period of No Snowfall

City	Air Temperature, Deg. F[2]		Wind Velocity, Freezing Period,[6] mph
	Over 32	Below or Equal to 32	
	Per-cent of Winter Hours with No Snow at Above Temperatures		Mean Temperature During Freezing Period[6]
Hartford, Conn.	56.4	38.9	24.4	8.2
Boston, Mass.	64.6	31.4	24.7	14.2
Falmouth, Mass.	68.5	29.5	25.5	12.8

Period of Snowfall[3]

City	Hours of Snowfall[2]		Free Area Ratio, A_r	Required Output, Btu per Sq. Ft. per Hr.[4]									Maximum Output, Btu per Sq. Ft. per Hr.
	Per-cent	Hr. per Year		0–49	50–99	100–149	150–199	200–249	250–299	300–349	350–399	400–up	
				Frequency Distribution of Snowfall Hours at Above Outputs, Per-cent[5]									
Hartford, Conn.	4.7	171	1	48.4	34.6	11.2	4.3	0.8	0.7	—	0.1	—	396
			0	80.4	16.7	2.2	0.5	—	0.1	—	0.1	—	383
Boston, Mass.	4.0	145	1	51.5	30.0	12.3	4.3	1.2	0.6	0.1	—	—	320
			0	83.2	14.0	2.0	0.3	0.3	0.1	—	0.2	—	370
Falmouth, Mass.	2.0	73	1	50.0	33.9	14.2	1.6	0.3	—	—	—	—	204
			0	91.5	7.4	1.1	—	—	—	—	—	—	144

[1] The period covered by this table is from Nov. 1 to March 31, incl., with February taken as a 28¼ day month. Total hours in period = 3630.
[2] The percentage in Columns 2 and 3 plus the percent under hours of snowfall total 100%. Note that "Hours of Snowfall" does not include idling time, and is not actual operating time. See text.
[3] Snowfalls of trace amounts are not included; hence, "Hours of Snowfall" includes only those hours of 0.01 inches water equivalent per hour snowfall.
[4] Output does not include allowance for back or edge losses since these depend on slab construction.
[5] Percentages total 100% of the number of hours of snowfall.
[6] "Freezing Period" is that during No Snowfall when the air temperature is 32 deg or below.

sidewalk. If that is so, then back losses would be slight and in this case could be ignored. The heat exchanger would then be sized for $q = 255$ and an area of 20,000 square feet or $Q = 20{,}000 \times 255 = 5{,}100{,}000$ Btu per hr.

New England Region

The New England region as it is defined in this article includes all of the states of Connecticut, Rhode Island, and Massachusetts. In addition it includes the southern part of New Hampshire and Maine. For the northern sections of New Hampshire and Maine see the Northeast Region in the February, 1957 issue.

This unusual definition of New England is based on a climatological grouping. Northern Maine is considerably colder than Boston, hence it is not logical to group Bangor, Augusta, and cities in that area with Boston and Hartford.

The cities chosen to represent this region are Hartford, Connecticut; Falmouth, Massachusetts; and Boston. All three cities have variable climate. As someone once said, "If you don't like New England weather, wait a minute."

Southern New England is the average winter-position boundary between cold, dry, polar air and warm, moist, tropical air. This is the chief reason for the extensive winter storm activity and extreme changeability of the weather. Except for the Berkshire Mountains to the west, there are no significant land masses to affect the climate. The prevailing winds are northwesterly in the winter; hence the Atlantic Ocean effect is minimized.

Since the cities are quite close geographically it is permissible to discuss the weather of the Region rather than of the three cities individually. The growing season is a full six months. The first killing frost in the fall is mid-October (ranging from October 17 in Hartford to November 1 in Providence). The last killing frost in the spring is mid-April (ranging from April 14 in Provi-

TABLE 3—DESIGN DATA FOR SNOW MELTING SYSTEMS, NEW ENGLAND REGION

City	Design Output, Btu per (Hour) (Sq Ft)		
	Class I System[1]	Class II System[2]	Class III System[3]
Hartford, Conn.	115	254*	260*
Boston, Mass.	107	231*	255*
Falmouth, Mass.	93	144	165

[1] For Class I (residential) Systems, the design output is set at that required heat output (see Table 2) when $A_r = 0$ at the 98th percentile of the frequency distribution; that is, where 98% of the hours have this output or less.
[2] For Class II (commercial) Systems, the design output is the maximum output when $A_r = 0$ in Table 2 (last column).
[3] For Class III (industrial) Systems, the design output is determined by the following four requirements: (1) Output is never exceeded for two consecutive hours; (2) Output for $A_r = 1$; Table 2, is at least 1 Btu per hour per sq ft greater than maximum output for $A_r = 0$; (3) A_r is greater than or equal to 0.5 the maximum requirement shown in Table 2 for $A_r = 1$. That is, $q_d = q_s + q_m + 0.5\,(q_s + q_h)$ for the conditions where $q_t = q_s + q_m + q_h + q_s$ are a maximum; (4) The free area ratio A_r is unity for at least 98% of the hours listed in Table 2.
* See Discussion of Design Rate.

dence to April 19 in Hartford).

The first measurable snowfall usually occurs in November, and the last in March, although some snowfall occasionally occurs in April. The average annual snowfall is about 40 inches per year. February generally has the greatest amount and January is next. In January, 1948 Boston had 32.5 inches of snow and for the year had a total of 89.2 inches. In contrast, the winter of 1936-1937 was very mild and only 9.0 inches of snow fell. It is unusual for the ground to remain covered with snow for prolonged periods, although some 70 days per year have snow on the ground in Boston.

The temperature pattern is interesting. Hartford has recorded a low of −24 deg F in February, 1943, and a record high of 69 deg in February, 1930. Both Boston and Hartford have an *annual* average temperature of 50.1 deg F. The *winter* average for the five months, November to March is 33.9 deg in Boston and 33.2 deg in Hartford. Notice in Table 2 that at Falmouth the temperature is above freezing 68.5% of the time. Falmouth is at approximately the same latitude as Cheyenne, Wyoming, but Cheyenne has 46.4% of its winter at freezing temperature. This illustrates the warming effect of the Atlantic Ocean.

Table 2 illustrates a unique condition for Hartford. For the $A_r = 0$ cases, there are two gaps in the data. One gap is in the cell 200-249, the other in the cell 300-349. This is discussed in greater detail in the section Discussion of Design Rate. Another unusual condition in Table 2 is the large spread in the maximum output values for $A_r = 0$ and $A_r = 1$ for Boston. Both the values of 370 and 320 occurred simultaneously hence are of less significance.

Actually when $q_0 > q_1$ (where the subscript refers to the A_r value) we have a meaningless condition from a snow melting standpoint because the air temperature must be higher than 33 deg F. Under such conditions the snow will melt of its own accord.

Table 3 is discussed at some length in a later section. Notice in Table 4, however, that there is practically no difference in the yearly output for a Class II or III system in any of the cities. On the other hand, a Class I system in Hartford would have twice the annual output of a Class III system in Falmouth.

TABLE A. CLIMATOLOGICAL DATA FOR SNOW STORM ON DECEMBER 18, 1951

City	Time	t_a	S in.	V mph	r.h. %	q_a $A_r=0$ Btu per (Hr) (Sq Ft)	q_a $A_r=1$ Btu per (Hr) (Sq Ft)
Hartford	10 am	16	.01	4	74	8	51
	11	15	.05	5	85	40	90
	12	16	.08	12	87	63	154
	1 pm	19	.17	11	88	133	205
	2	28	.14	4	92	106	121
	3	31	.51	15	98	383	396
Boston	6 pm	39	.50	15	97	365	320

New England with its heavy concentration of population, hence heavy traffic, and its changeable weather is an excellent snow melting market. Systems in Boston and Hartford would operate about 500 hours per year (for snowfalls of 150-175 hours per year). Operating costs are moderate because most of the snowfall occurs at relatively warm temperatures.

Discussion of Design Rate

Notice that in Table 3, for Hartford and Boston, there are departures from the rules for establishing design rates for Class II and III systems. The rule for establishing a Class II design rate states that the design rate should be equal to the maximum required output for $A_r = 0$ (see Table 3). According to Table 2, these rates would be 383 and 370 for Hartford and Boston respectively. Table 3 lists the design rates at 254 and 231. These departures can be explained best if the climatological data are studied.

On the morning of December 18, 1951, a storm swept through New England. It was not violent, and probably nobody thought much about it. The temperature had been around the freezing mark in Boston, but it was about

TABLE 4—YEARLY OPERATING DATA, NEW ENGLAND REGION

City	Idling			Melting		
	Time,[1] Hr. per Year	Rate,[2] Btu per (Hour) (Sq. Ft.)	Output,[3] Btu per (Year) (Sq. Ft.)	Time,[4] Hr. per Year	Class[5]	Output[6] Btu per (Year) (Sq. Ft.)
Hartford, Conn.	1412	41.9	59,200	171	I	9,830
					II	10,800
					III	10,810
Boston, Mass.	1140	52.1	59,400	145	I	8,000
					II	9,080
					III	9,100
Falmouth, Mass.	1071	44.2	47,400	73	I	3,830
					II	4,250
					III	4,290

[1] From Table 2, Column 3 × 3630 (hr per year).
[2] Rate when idling, Btu per (Hr) (Sq Ft) = (0.27V + 3.3) (32 − t), where V = wind velocity from Column 5, Table 2, and t = air temperature from Column 4, Table 2.
[3] Product of the two preceding columns.
[4] Hours of Snowfall from Column 7, Table 2.
[5] See footnote for Table 3.
[6] Based on the condition that surface temperature is maintained at 33 deg until required output exceeds design output, at which time design output is used regardless of required output. Distribution of required output based on Table 2.

TABLE B. SNOW STORM DATA FOR BOSTON, NOVEMBER 7, 1953

Time	t_a	S in.	V mph	r.h. %	q_a $A_r=0$ Btu per (Hr)	$A_r=1$ (Sq Ft)
1 am	40	.26	53	95	189	47
2	40	.32	46	99	233	89
3	41	.51	55	97	370	189
4	41	.23	54	95	167	2

TABLE C. OUTPUTS FOR CLASS III SYSTEMS USING FOOTNOTE RULES FROM TABLE 3

Rule	Hartford	Boston
1	260	255
2	255+	232+
3	236+	169+
4	191	197

+ If the storm of December 18, 1951, is ignored.

15 deg F in Hartford. A warm, moist air mass moved in, and about 10:00 a.m. it started to snow in Hartford. The temperature started to climb and by 3:00 p.m. the snow was almost a rain, and the temperature was 31 deg. The unusual thing about this storm was that the snow had exceptionally high water content. As a result, the required output for $A_r = 1$ and $A_r = 0$ were 396 and 383 at Hartford. In Boston, since the air temperature had climbed to 39 deg the values were $q = 320$ for $A_r = 1$ and 365 for $A_r = 0$. This snow was recorded for just one hour in Boston, apparently the weather observer recorded the precipitation as rain after that. The data for that storm appear in Table A.

On November 7, 1953, Boston had a similar storm, but Hartford did not feel the effects of that one. Table B contains data for the storm.

Because of the extremely high winds the data for q when $A_r = 1$ may not be accurate; furthermore, from a *snowmelting* standpoint conditions of $q_1 < q_0$ are meaningless.

The distribution given for Boston in Table 2 indicates that almost once every four years a *one hour* fall can be expected at values above 350. But in both of these examples, notice that the air temperature was 39 and 41 deg or well above freezing. Because of this infrequent condition and the relatively common occurrence of snow falling at temperatures above 32 deg F—when probably it will melt as rapidly as it falls—it was decided to ignore those two cases. In addition, records indicate that the maximum output for $A_r = 0$ where $t_a \leq 32$ deg F is 150 Btu per (hr) (sq ft).

A similar condition exists for Hartford. If the one hour of the storm of December 18, 1951, is ignored, the maximum values for $A_r = 1$ and 0 are 288 and 254 respectively. Here again the maximum output for $A_r = 0$ occurs at an air temperature above freezing; it is 33 deg F in this case.

It is interesting to observe in Table C the various outputs for Class III systems using the four rules given in footnotes for Table 3.

Hence the Class III design rates are 260 and 255 for Hartford and Boston respectively. It is interesting also to study the condition of the storms that are indicated by rule No. 1. In Boston, a storm started at 10:00 p.m. on January 10, 1954, and it lasted 30 hours. Its climax developed during the period between 3:00 a.m. and 11:00 a.m., January 11. The air temperature was 10 or 11 deg and the wind was blowing about 20 mph. For these nine consecutive hours the required output for $A_r = 1$ was 234, 274, 234, 202, 255, 260, 246, 289 and 200. For $A_r = 0.5$, however, the outputs dropped to 149, 145, 133, 117, 139, 154, 127, 149 and 104.

Another interesting comparison is the case of two storms in Hartford on December 26, 1947, and March 19, 1956, as given in Table D. The latter storm is responsible for establishing the Class III design rate.

Because of the values at 7 and 8 a.m. on March 19, the design rate for a Class III system according to rule No. 1, was established at 260. During this storm, however, the $A_r = 0.5$ rate reached a maximum of 215 as compared to 236 in December, 1947.

Incidentally the heaviest snowfall in 24 hours in Hartford started at noon on February 28, 1949. By noon of March 1, 19.0 inches of snow had fallen. The heaviest load occurred at 1:00 a.m., March 1. The loads were 124 and 91 Btu per (hr) (sq ft) for $A_r = 1$ and 0. That storm was steady but at no time did it pose a difficult design problem.

TABLE D. CLIMATOLOGICAL DATA FOR TWO SNOW STORMS AT HARTFORD, CONN.

Date	Time	t_a	S	v	t_{wb}+	$A_r=0$	$A_r=1$	$A_r=0.5$
12/26/47	11 am	24	.08	16	24	62	123	93
	12	24	.19	19	24	146	217	182
	1 pm	26	.11	16	26	84	134	109
	2	25	.24	33	25	184	288	236
	3	26	.24	25	26	183	254	219
	4	27	.20	22	27	152	207	180
	5	28	.05	26	28	38	91	65
3/19/56	4 am	20	.03	18	20	23	121	72
	5	20	.05	17	20	39	134	87
	6	19	.05	18	19	39	144	92
	7	19	.17	22	19	133	260	197
	8	19	.21	17	19	164	265	215
	9	19	.20	17	19	157	258	208
	10	20	.11	18	20	86	183	135

+ Wet bulb temperature was recorded instead of relative humidity.

CORROSION OF FANS IN EXHAUST SYSTEMS

Material Used in Exhaust Fan	Acid Dipping, Pickling, and Stripping	Alkaline Cleaning	Anodizing	Coating — Enamel and Lacquer	Decarbonizing	Degreasing and Metal Cleaning	Hardening and Quenching	Plating	Washing and Rinsing
Steel	E — P	E — F	S — F	E	E — S	E — S	E — S	E — P	E — P
Aluminum	S	S	S	E	—	—	—	S	E
Galvanized steel	—	E	—	—	—	E — S	E — S	—	—
Cast iron	E	E	—	—	—	—	—	E	E
Brass	—	—	—	E	E	E	—	—	—
Lead	E	—	—	—	—	—	—	—	—
Asphalt paint	S — P	E — P	E	—	P	—	—	E — S	S — P
Vinyl resin paint	—	—	E	—	—	—	—	S	—
Red lead paint	E	—	E	—	—	—	—	—	—
Hot asphalt	—	—	—	—	—	—	—	—	S
Phenolic resin baked coating	S	S	E	S	—	—	—	E — S	—
Hard rubber lining	E	E — S	E	—	E	—	—	E	E
Soft rubber	E — S	—	—	—	—	—	—	E	—
Neoprene	E	E	E	E	—	—	—	E	E
Everdur	E	E	—	—	E	—	—	—	—
Korolac	F	F	—	—	F	—	—	—	—
Pressed wood	—	—	—	—	—	—	—	—	—
Stainless steel AISI 316	—	E	—	—	—	—	—	—	—
Acid bronze	P	—	—	—	—	—	—	—	—

The accompanying table shows the relative performance of materials used in exhaust fans with respect to their resistance to corrosion when used in common industrial applications. The table is presented through the courtesy of the Division of Industrial Hygiene, New York State Department of Labor.

According to the Division, radial-blade (paddle wheel) type fans are normally recommended for all services where materials are carried in the air stream, as the blades stay cleaner and are less likely to corrode than when curved blades are used. The casing of the radial blade fan is heavy, will last longer, and is more accessible for cleaning than the lighter casings normally used on forward-curved and backward-curved blade fans. Cleanout doors and bottom drains are recommended on all fans on open tank operations. Larger size curved blade fans are especially suitable when casings two gages heavier than normal are used. The deposits which build up on fan wheels and casings should be removed by regular cleaning, and the surface repainted where any coating has been broken and removed.

Letters are used in the tables to indicate the approximate service life of the various listed materials, the key to these letter symbols being as follows:

Letter Symbol and Definition	Approximate Service Life
E — Excellent	Over 5 years
S — Satisfactory	2 to 5 years
F — Fair	6 months to 2 years
P — Poor	6 months
Combinations	Variable performance

SURFACE AREA OF FLANGED FITTINGS

STANDARD FLANGED FITTINGS PLUS ACCOMPANYING FLANGES										
Nominal Diameter, Inches	90° Elbow		Long Radius Ell		Tee		Flanged Coupling		Cross	
	Area, Sq. Ft.	Feet of Pipe	Area, Sq. Ft.	Feet of Pipe	Area, Sq. Ft.	Feet of Pipe	Area, Sq. Ft.	Feet of Pipe	Area, Sq. Ft.	Feet of Pipe
1	.80	2.31	.89	2.59	1.24	3.59	.32	.93	1.62	4.72
1¼	.96	2.20	1.08	2.49	1.48	3.40	.38	.88	1.94	4.47
1½	1.17	2.35	1.34	2.68	1.82	3.64	.48	.95	2.38	4.78
2	1.65	2.65	1.84	2.96	2.54	4.08	.67	1.08	3.32	5.34
2½	2.09	2.78	2.32	3.08	3.21	4.26	.84	1.12	4.19	5.56
3	2.38	2.60	2.68	2.93	3.66	3.99	.95	1.03	4.77	5.70
3½	2.98	2.85	3.28	3.13	4.48	4.28	1.12	1.07	5.83	5.56
4	3.53	2.90	3.96	3.36	5.41	4.59	1.34	1.14	7.03	5.97
4½	3.95	3.01	4.43	3.38	6.07	4.63	1.47	1.13	7.87	6.01
5	4.44	3.05	5.00	3.43	6.81	4.67	1.62	1.11	8.82	6.06
6	5.13	2.95	5.99	3.45	7.84	4.53	1.82	1.05	10.08	5.81
7	6.17	3.09	7.38	3.70	9.37	4.69	2.17	1.10	12.00	6.01
8	6.98	3.09	8.56	3.79	10.55	4.67	2.41	1.07	13.44	5.96
9	8.71	3.46	10.57	4.20	13.18	5.23	3.00	1.19	16.78	6.66
10	10.18	3.61	12.35	4.38	15.41	4.47	3.43	1.22	19.58	6.95
12	13.08	3.92	16.35	4.90	19.67	5.89	4.41	1.32	24.87	7.45
14	16.38	4.47	20.17	5.47	24.81	6.78	5.39	1.47	31.48	8.60
15	18.50	4.72	22.92	5.83	27.91	7.10	6.18	1.57	35.48	9.04
16	20.17	4.82	25.41	6.07	30.32	7.23	6.69	1.60	38.34	9.15

EXTRA-HEAVY FLANGED FITTINGS PLUS ACCOMPANYING FLANGES										
Nominal Diameter, Inches	90° Elbow		Long Radius Ell		Tee		Flanged Coupling		Cross	
	Area, Sq. Ft.	Feet of Pipe	Area, Sq. Ft.	Feet of Pipe	Area, Sq. Ft.	Feet of Pipe	Area, Sq. Ft.	Feet of Pipe	Area, Sq. Ft.	Feet of Pipe
1	1.02	2.95	1.08	3.15	1.58	4.58	.44	1.27	2.07	6.02
1¼	1.10	2.52	1.34	3.08	1.93	4.43	.51	1.17	2.53	5.82
1½	1.33	2.67	1.87	3.76	2.68	5.38	.73	1.46	3.54	7.11
2	2.01	3.23	2.16	3.47	3.09	4.97	.85	1.36	4.06	6.53
2½	2.57	3.41	2.76	3.67	4.05	5.38	1.11	1.46	5.17	6.87
3	3.49	3.81	3.74	4.08	5.33	5.82	1.48	1.62	6.95	7.58
3½	3.96	3.78	4.28	4.09	6.04	5.77	1.64	1.57	7.89	7.54
4	4.64	3.94	4.99	4.24	7.07	6.00	1.91	1.62	9.24	7.84
4½	5.02	3.83	5.46	4.17	7.72	5.90	2.04	1.56	10.07	7.69
5	5.47	3.76	6.02	4.13	8.52	5.85	2.18	1.50	10.97	7.53
6	6.99	4.03	7.76	4.48	10.64	6.14	2.78	1.60	13.75	7.93
7	8.62	4.32	9.73	4.87	12.33	6.18	3.46	1.73	16.83	8.43
8	9.76	4.32	11.09	4.91	14.74	6.53	3.77	1.67	18.97	8.41
9	11.44	4.54	13.17	5.23	17.23	6.84	4.44	1.76	22.10	8.77
10	13.58	4.82	15.60	5.54	20.41	7.25	5.20	1.85	26.26	9.32
12	17.73	5.31	18.76	5.62	26.65	7.99	6.71	2.01	34.11	10.22
14	22.31	6.08	25.70	7.02	33.63	9.18	8.30	2.26	43.15	11.75
15	25.28	6.43	29.34	7.47	38.04	9.68	9.52	2.43	48.79	12.40
16	27.18	6.48	31.73	7.58	40.94	9.78	10.05	2.40	52.35	12.50

First column is outside surface area in square feet; second column is length of straight pipe in feet with same surface area as in first column

Problems in Cell Block Heating

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Changes were made to the heating system serving a House of Correction, to eliminate improper heating conditions. Before and after conditions are covered.

ONE of the penal institutions administrated by the Department of Correction of the State of Maryland is the Maryland House of Correction at Jessup, Md. Attention was directed to this building because of complaints by prison authorities that there was overheating on the upper cell tiers and cold drafts at the lower levels.

To better understand the engineering problem presented, one must note that the original building was a brick structure with large glass areas. While this provided good light and ventilation, it did cause a heating problem. About 1915 the South and West Cell Wings were added, so arranged that the old building formed the connecting central hall for the two wings. These wings were of similar construction to the main hall and were equally difficult to properly heat. Changes were made in the original heating system several times, the last modification being made in 1940 using PWA funds. Complaints were still received from the prison authorities regarding overheating on the upper cell tiers and cold drafts at the lower levels.

In 1950, a program was started to correct the heating troubles. An analysis of the existing heating system and a suggested design for a new system was made by a consulting engineer and presented in a report to the Department of Public Improvements of the State of Maryland. This report was approved, and plans and specifications were prepared for the new system of heating.

Construction Details

The cell blocks or wings are similar in construction, differing a few feet only in length and width. The heating system for each is, therefore, very similar. The cell wings are approximately 250 ft long, 45 ft wide and 35 ft high to the top of the cells. The cells are of steel plate construction with steel jailwork fronts. All cells are four tiers high, with the cells placed back to back in the center of the building. There is a utility space at the back of the two cell rows, and the fronts of the cells face the outside walls. At intervals along the walls are large windows, approximately 7 ft wide and 26 ft high, with pivoted sash sections, motor operated, for ventilation.

The South Cell Wing had gravity roof ventilators exhausting from the cell block, and the West Cell Wing had power exhausters taking air from the utility space. However, in both wings the ventilation was poor due to the fact that the equipment had deteriorated to the point of being beyond repair. At times odors were very objectionable, particularly on the upper tiers.

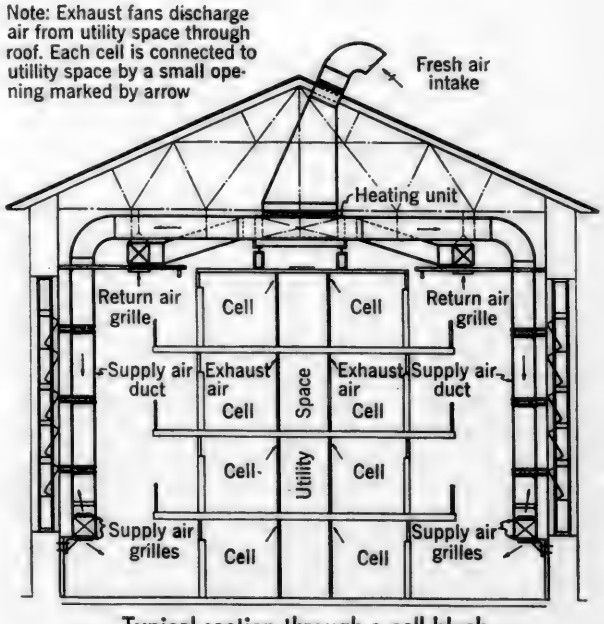
The heating system, before renovation, consisted of eight heating units of the blower type with cowls arranged to discharge air along the walls and into the lower cells. The units were wall hung, mounted approximately 7 ft clear of the floor. These units were supplied with steam at 5 psi and were in very poor condition due to corrosion, age, and mistreatment by inmates.

After several economic studies were made and considered, a new heating system was installed. It consists of two large heating units containing washable type filters, non-freeze heating coils and centrifugal blower type fans in the attic space above each cell block.

Fans at Heating Units

Exhaust fans connected to the return air duct are provided at each heating unit. A fresh air connection extending through the roof is placed at each heating unit for introduction of ventilation air to the area served by each unit. The amount of fresh air introduced may be regulated by adjusting a damper which controls the amount of air exhausted from the building or recirculated through the heating unit. The heated air is discharged through a vertical duct running down each outside wall and connecting to a horizontal duct running just under the window sills. This horizontal duct is approximately 7 ft above the floor and has grilles at 15 ft centers on the underside which discharge the warm air toward the cell tiers. Additional grilles are installed on top of the horizontal duct to discharge air upward at each window.

(*Continued on page* 136)



Typical section through a cell block.

Intermittent Heating of Buildings

Our correspondent abroad, who has recently spent several months in the United States, comments on the effects of the Suez situation and studies made on the intermittent heating of European buildings as a means of saving fuel.

THE Suez Canal has, as of this writing, been closed much longer than the seven weeks which British engineers estimated as the time physically necessary to clear it, and the effects are very obvious in London. For the first time in years it is worth while to hop on a bus (minimum fare 3 pennies) with the object of getting somewhere faster than by walking. London Transport operates 9100 road passenger vehicles covering between them over a million miles a day within a radius of 25 miles around Buckingham Palace. The proportion of private cars in this area in relation to commercial vehicles is in normal times much smaller than anywhere in America. Perhaps a third of the vehicles on a busy street would be private cars. But the disappearance of many of these has been enough to make an enormous difference. Road deaths in the country as a whole are running 30 percent below a year ago, which probably means that more people have been "saved" on the roads than were killed in the fighting. And as if to soften the discomfort of Sir Winston Churchill, driven from his country home by lack of fuel oil to heat it, Britain has had the mildest winter for decades. The water in the bird bath in your correspondent's garden has been frozen on one day only.

Unfortunately this happy state of affairs (for the non-motorist who heats his house with coal) will not last. The Syrian pipe line is to be mended and the Suez Canal is already open for small ships. So endeth the Busman's Holiday.

Intermittent Heating of Buildings

One way of economizing in fuel is to have a building warm only when it is in use. At other times it may be cooler and will therefore lose less heat. This obviously means that a smaller total quantity of heat will have to be supplied, and (provided the heating plant is efficient over a wide range of load) less fuel will be used. Whether money will be saved is the $64,000 Question, and a great deal more than that has been spent in trying to find out the answer.

A short time ago Dr. Aldo Gini summed up the position in an article in the excellent monthly journal of the Italian Thermotechnical Association (*La Termotecnica*, **8**, *4*, 245), published in Milan (Viale Piave, 20). Apparently Germany was the first country to think about intermittent heating, and most of the other engineers have used the early German work as a basis. During the war, however, and until recently, the Germans could only make theoretical progress. They have been much handicapped in making controlled observations and experiments, and have little new to contribute. Dr. Gini then looks at America, and finds no help at all; this is not because of poor technology, of course, but just lack of interest. It seems to him that Americans put in a plant that is plenty big enough and the occupier then practices such fuel economy as he thinks is worth the effort in view of the abundant supply of cheap fuel available to him. "Don't think; try" is quoted verbatim in the Italian text as summing up the American attitude.

Britain gets no mention whatsoever. It has to be remembered that Dr. Gini wrote his review before the presentation of Harrison's paper in London (referred to later) and before presentation of the paper by Pfenningworth and Merl Baker to the ASHAE Semi-Annual Meeting in Washington last summer. But the British approach via "background heating" and "topping-up" deserved at least some mention. A French paper by Cadiergues published in 1952 which gives a practical method of calculation is reviewed in some detail.

Dr. Gini then reviews his own work, showing its mathematical basis and deriving some simplified equations, and then going on to conclude that practical considerations are overriding. Each heating project presents a special case of its own, but broad recommendations can be put forward in the form of a simple table. This table, as illustrated, shows the percentage by which the maximum designed output of the heating plant should be increased over and above the capacity necessary to maintain the desired temperature under continuous operation, in order to obtain the best economy from an intermittent heating schedule. As would be expected, the table shows that it is worth while to put extra capacity into systems with which the temperature can be altered rapidly, whereas those with a very slow response should not be much oversized.

In the eyes of the world, the French people appear to approach problems in a rather theoretical and logical manner; they do not themselves regard this as a national characteristic. In the subject of intermittent heating they have reached a severely practical viewpoint. Mathematicians have attempted to find out, for a room, office, factory, and concert-hall that has to be comfortable

TABLE 1. PERCENTAGE INCREASE IN HEATING CAPACITY FOR INTERMITTENT OPERATION

Occupancy		Type of Plant				
Type	Hours of Use	Warm Air Heating		Radiators		Panel Heating
		Steam	Water	Steam	Water	
Houses continuously occupied	Not reduced at night	10	10	—	—	—
	Reduced at night	10	10	10	10	5
Restaurants	16-18 hours	20	20	15	10	10
Offices	8-12 hours	30	25	20	15	10
Schools	6-8 hours	40	30	25	25	15
Theaters	4-6 hours	50	40	30	30	20

for occupation at a certain hour of the day and remain so during the period of occupation, (a) how big the plant should be, (b) how many hours before and after the beginning of occupation it should be run at maximum load, (c) what load it should be run at for the rest of the time, (d) when it should be shut down, and (e) what combination of answers gives minimum overall cost. It is obvious that minimum fuel consumption is associated with minimum heat loss, achieved by having the building heated for the minimum time and as cool as possible outside the hours of occupation, but this means rapid heating with a large plant, and does not necessarily reduce total cost.

The mathematics can be handled for a space which is "blind and tight". This phrase has nothing to do with intoxication but means the absence of windows or ventilation. Rene Dupuy described a practical method of extending the mathematics, with reasonable accuracy, to real rooms with floors, ceilings, windows and outside walls, as well as some air exchange, in a paper to the Association of French Heating and Ventilating Engineers (*Chauffage, Ventilation, Conditionnement,* **33,** 2, 11). The necessary simplification was achieved by using the concept of equivalent temperature and a new concept called the "thermal avidity" of the walls which enables their effects to be averaged.

But in the discussion on this paper G. Prud'hon, speaking as a practical engineer, threw the mathematicians out of court and their calculations after them. He said flatly that no client would pay for a heating plant more than 30 or 35% oversize, no matter how many mathematicians proved to him that he could save fuel by putting in one bigger still. He gave the following six guiding rules:

1. Avoid danger of freezing; this may mean that one cannot shut down the plant completely in any case.
2. Allow different normal temperatures; when the staff come in first from the outside they will be satisfied with a temperature several degrees below the midday normal, especially if the radiators are too hot to touch.
3. Put the extra capacity in the boiler house, not in the heating surface; if the building is cold the output per sq ft of radiator surface is increased anyway.
4. Design the heating installation with low thermal capacity so that little time is lost in starting to heat the building.
5. Do not forget psychology; if the radiators do not remain warm to the touch right up to the end of the working day, the occupants will complain of feeling cold, whatever the actual temperature.
6. There are limits to intermittency set, for example, by damage to books and other things if the relative humidity changes too much.

If the building contains a large proportion of corridors, stores, etc., which are not to be heated to comfort levels anyway, then it will be essential to put the spaces which are to be heated intermittently on a separate circuit, and this increases the cost. If one uses an ordinary thermometer there is a vast difference in the rate of attainment of a given temperature from cold condition with a warm air system at one extreme and with a panel system at the other. A method of measuring temperature which is much influenced by radiation, such as the *resultant thermometer,* will show a much more rapid attainment of the desired condition with radiant panel heating.

In spite of the blast at this ounce of practice, E. Harrison has a good word to say for the pound of French theory in his paper to the Institution of Heating and Ventilating Engineers (*Journal,* **24,** p. 145 to 198). This is probably the most comprehensive and up-to-date review of this subject, and contains 36 references, the only obvious omissions being the Italian papers. The first part of the paper contains a discussion of the analytical solutions of the equation of unsteady heat flow and their applicability to the heating and cooling of buildings. This is surprisingly readable for such a

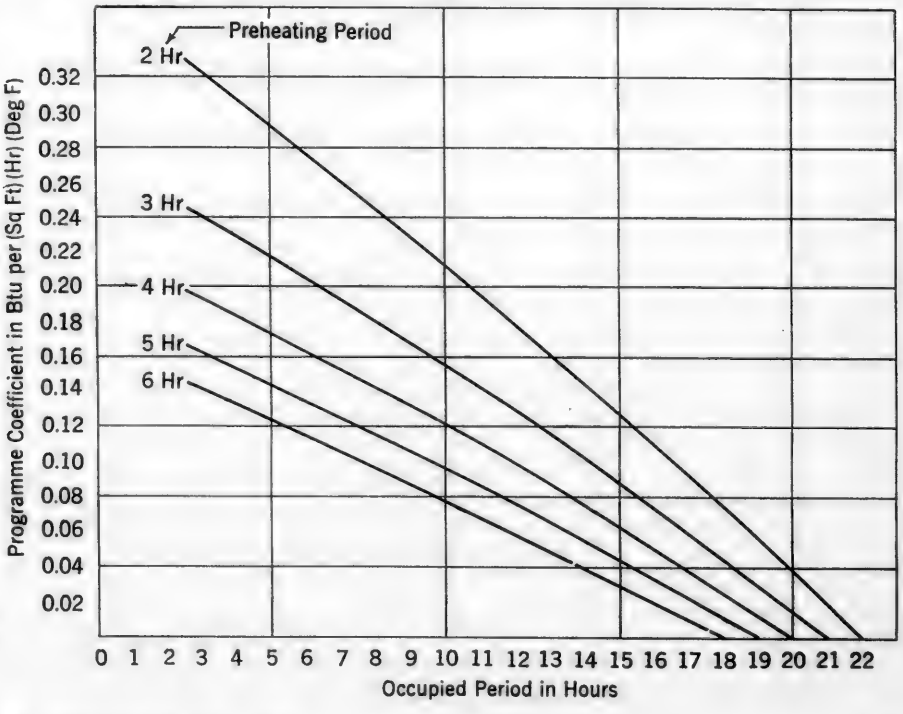


Fig. 1. Effect of occupied time and preheating period on programme coefficient for use in calculating either total preheating input rate required for a given programme, or preheating time required for a given occupied period and heat input rate.

mathematical subject, and only 6 simple equations are given.

In the second part of the paper the method of "finite differences" is described in some detail, and since the author takes seven pages of text, four diagrams and quite a lot of mathematics to do this, no attempt will be made here. In the third part of the paper the finite difference method is applied to actual cases of rooms and buildings, and the results obtained are compared with other methods of calculation, such as the Newtonian method given by Raber and Hutchison in Refrigeration and Air-conditioning Engineering, 1945, or E. G. Smith's Absorbance Method (1942).

In the fourth part of the paper the Cadiergues method already referred to in the paper by Gini is described in detail and commended. In brief, the method consists in reading from a graph (Fig. 1) value of coefficient *C* in Btu per (sq ft) (hr) (deg F) which depends only on the programme of occupation and preheating times, and applying this to the calculation of the additions due to intermittence. The steady-state heat losses from the building are calculated by the normal method, but in addition the internal surface area of all partitions and internal floors and ceilings has to be evaluated. The total rate of heat input required in the preheating period is then given by the equation:

$$Q = Q_o + CQ_v/1.43 + CA(t_a - t_o)$$

where Q = total rate of heat supply required in Btu per hr

Q_o = steady state heat loss (including air change) in Btu per hr

Q_v = rate of heat loss in air change in Btu per hr

1.43 (or other factor) is the average internal surface conductance for all room surfaces in Btu per (sq ft) (hr) (deg F)

A = area of *all* room surfaces in sq ft

t_a = air temperature

t_o = outside temperature

C is read from the graph in Fig. 1 in Btu per (sq ft) (hr) (deg F)

The equation can obviously be used either (a) to calculate the total preheating input rate required for a given programme, or (b) to calculate the preheating time required when given an occupied period and a heat input rate. It should be understood that the method is applicable only to buildings operating on a 24-hour cycle, and will not give the preheating rate required for longer off-periods than a single night's shutdown. It makes no allowance, either, for a limited heat input during the off-period, such as might be dictated by frost-protection requirements, or banked or kindling-control operation of boilers.

Harrison goes on to consider the margins obtainable with common types of heating systems. Radiator systems can be increased in output by 28% by raising the flow temperature from 180 to 205 deg with a cost only of extra boiler capacity. The margin obtainable from a floor panel system depends on what temperature the floor finish will stand; if a system normally operating at 75 deg in a room at 62 deg has the surface temperature raised to 88 deg, the output can be increased 100 percent. Ceiling panels are usually worked near the safe limit of temperature so that an increased margin will have to be paid for in the form of extra panelled surface. In the case of heated aluminum (acoustic) ceilings there is everything to be said for heating the whole ceiling area. Time lags of different rooms in one building may be sufficiently different to cause difficulties in controlling an intermittent system; this, as well as the cost of providing the additional capacity, must be taken into consideration in calculating the savings that can be made.

The author concludes that actual field research on the economics of intermittent heating is desirable, and that there is need for research and development on automatic control, on time lags of existing types of heating systems, and on the development of new types and methods of heating with a view to intermittent working. The printed paper with eleven pages of discussion is obtainable from Institution of Heating and Ventilating Engineers (49. Cadogan Sq., London, S.W.I.).

Study Proves Plastic Pipe Suitable for Potable Water Supplies

Studies, extending over three years, of 22 samples of plastic pipe to determine their suitability for underground use in conducting cold potable water proved that plastic pipe weathers well, delivers odorless and tasteless water, resists chlorine, and can be disinfected.

Conducted by National Sanitation Foundation at the School of Public Health, University of Michigan, Ann Arbor, the tests were sponsored by the Society for the Plastics Industry for its Thermoplastic Pipe Division and for suppliers of plastic materials.

Water as aggressive or more aggressive than any likely to be found in public or private supplies, was used in the test. Ann Arbor water with its pH reduced to 5.0 by bubbling CO_2 through it met this requirement. Results showed that no deleterious substances were released from any pipe recommended by its manufacturer for domestic water supply.

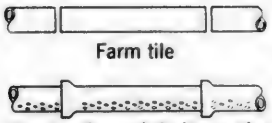
After infecting four general types of pipe, hooked up in recirculating systems, with heavy cultures of *E. coli*, the systems were disinfected with hypochlorite, flushed with fresh tap water, rinsed with de-chlorinated water. Rinse water was tested. Residuals of the germ were insignificant.

All classification of pipe are susceptible to rodent attack when plastic obstructs access to food, the studies showed. Polyethylene is most susceptible, probably because of its softer nature. However, there is no evidence, the report of the studies says, that rats eat the plastic in preference to other substances.

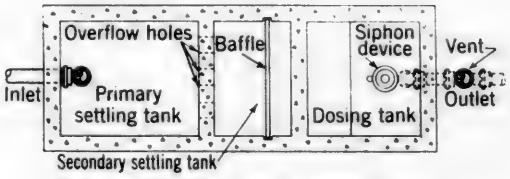
A plan is being developed by the National Sanitation Foundation Testing Laboratory in cooperation with plastic pipe manufacturers whereby the Foundation's seal of approval may be applied to every foot of pipe made from material found safe for use with cold potable water.

A complete report on these studies, directed by Walter D. Tiedeman, executive director of the Testing Laboratory, is published by the National Sanitation Foundation, Ann Arbor, Mich. Price is one dollar.

SEPTIC TANKS FOR SMALL BUILDINGS



TYPES OF DRAINAGE PIPING



PLAN OF SEPTIC AND DOSING TANKS
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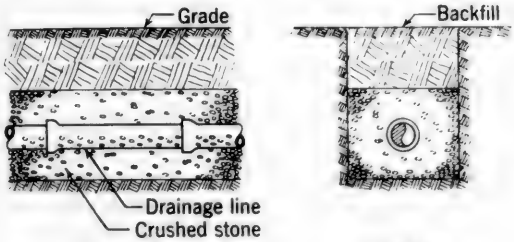
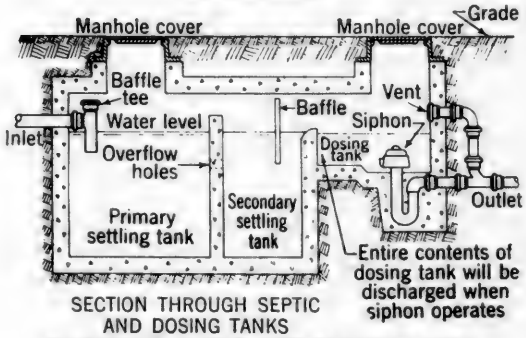


ELEVATION THROUGH TRENCH

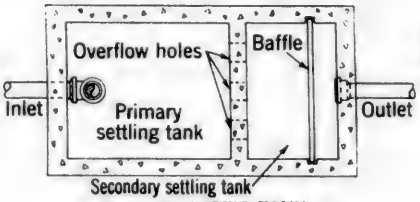
SECTION THROUGH TRENCH

INSTALLATION OF PIPING IN TRENCH



SECTION THROUGH SEPTIC AND DOSING TANKS

COMBINED SEPTIC AND DOSING TANKS



PLAN OF SEPTIC TANK
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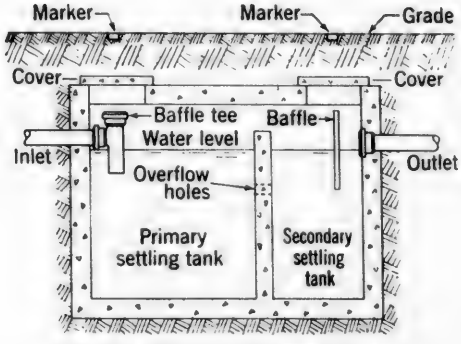
If required by local authorities, vents can be extended above grade.

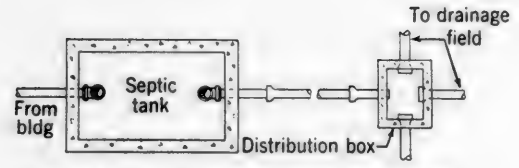


SECTION THROUGH SEPTIC TANK

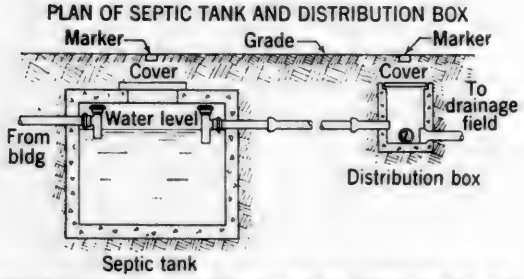
DETAILS OF SEPTIC TANK

Drawings Through the Cooperation of Louis Blendermann

SEPTIC TANKS FOR SMALL BUILDINGS

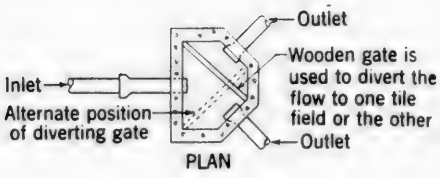


PLAN OF SEPTIC TANK AND DISTRIBUTION BOX

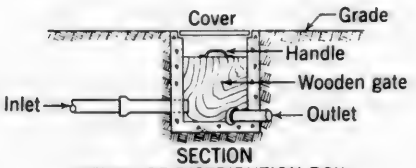


SECTION THROUGH SEPTIC TANK AND DISTRIBUTION BOX

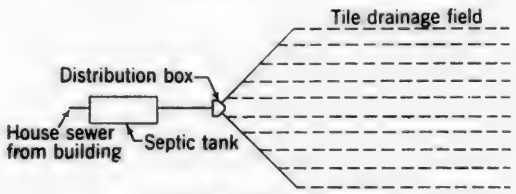
ARRANGEMENT OF A DRAINAGE FIELD


Outlet
Wooden gate is used to divert the flow to one tile field or the other
Inlet
Alternate position of diverting gate
Outlet

PLAN

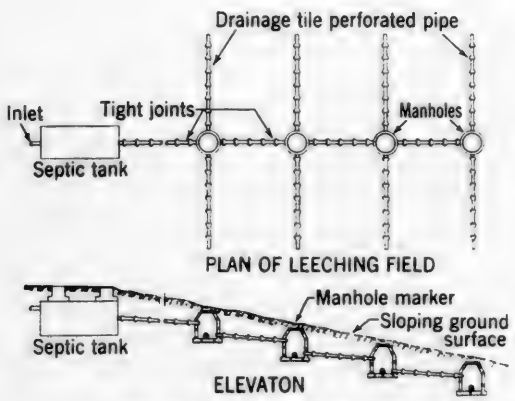


SECTION
DETAIL OF DISTRIBUTION BOX

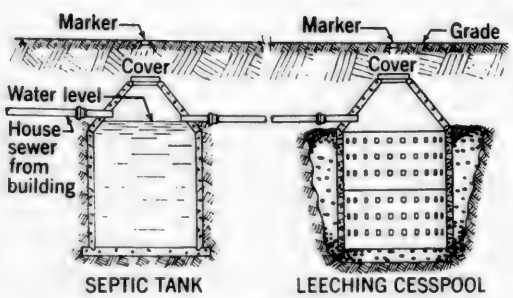


TYPICAL ARRANGEMENT OF
SEWAGE DISPOSAL SYSTEM

METHOD OF DISTRIBUTING FLOW
OVER DRAINAGE FIELD



DETAILS OF LEECHING FIELD
FOR USE WITH SEPTIC TANK



ARRANGEMENT OF SEPTIC TANK
AND LEECHING CESSPOOL

Drawings Through the Cooperation of Louis Blendermann

Special Report

GOVERNMENT-INDUSTRY AIR CONDITIONING SYMPOSIUM

Few people realize that the Federal government is already the largest single customer for air conditioning. The General Services Administration alone is responsible for the management of seven thousand existing buildings which do not include buildings under the direction of the armed services. Consequently, the Government-Industry Symposium on Air Conditioning held in Washington April 3-4 was of great importance, not only to government engineers but to consulting engineers and their staffs who design air conditioning systems for the government, contractors who install such systems in government buildings, manufacturers of equipment, and utility companies to whose lines the systems are connected.

AIR CONDITIONING, HEATING AND VENTILATING—MAY, 1957

GOVERNMENT-INDUSTRY AIR CONDITIONING SYMPOSIUM

THIS Symposium was arranged as a joint effort by the Federal Government as represented by the Business and Defense Services Administration of the U. S. Department of Commerce, and the air conditioning industry, represented by Air Conditioning and Refrigeration Institute, of which George S. Jones, Jr. is managing director.

The symposium brought together leaders in the governmental agencies involved, both civilian and military, as well as leaders in the industry. The symposium had a four-fold objective:

(1) To recognize air-conditioning as a modern necessity;

(2) To pool the knowledge of the Government and of industry in an effort to obtain maximum benefit of manpower and money spent on air conditioning;

(3) To develop a better understanding of what air conditioning can accomplish for Government, industry and domestic users, and

(4) To lay the groundwork for an active program of Government-industry cooperation in the study of present and future common air conditioning problems.

Space does not permit the presentation on these pages of all of the excellent papers presented at the symposium. However, eight have been abstracted in this Special Report, the abstracts containing, we believe, the most important portions of the papers reproduced.

GROWTH OF AIR CONDITIONING INDUSTRY

CLOUD WAMPLER
Chairman of the Board, Carrier Corp.

. . . Air conditioning, despite its 60-fold volume increase in two decades, is still on the lower reaches of its growth curve. Although air conditioning today seems to be everywhere, the ripe markets of the future will undoubtedly make last year's record appear small by comparison. I would estimate that total industry sales at retail, including heating systems adaptable to air conditioning, will reach $5 billion in 1961.

If a non-air conditioned building is operated at a competitive disadvantage today—and it is—what dimensions will that problem attain five years hence? All of us at the present time would prefer to patronize an air conditioned restaurant or theater. Tomorrow your employees will find non-air conditioned offices unacceptable. The trend is inevitable.

I stress office buildings because they have played a vital role in the post-war expansion of our industry. Since 1945, virtually every such major structure erected has included central year-round air conditioning. And this, by sheer economic necessity, has made air conditioning a definite requirement for existing first class office buildings.

We have formulated a rule of thumb which seems to operate in this manner: Whenever air conditioned office space in a city reaches a level of from 18 to 20%, the remaining office buildings must also air condition in order to maintain Class A status.

New York City is a good example of this rule in operation. Since the end of World War II, 71 large multi-story structures with nearly 23 million square feet of air conditioned space have been constructed. The critical level of 18% was reached about four years ago. And within the last four years, 24 major existing office buildings have installed year-round systems, adding another 10 million square feet.

In Dallas and Houston, for example, the cycle has been completed. There, all major existing office buildings have been air conditioned. In fact, this applies to Class A space in most large metropolitan areas below the Mason-Dixon Line.

In Philadelphia the critical point has been reached and conversion to year-round air conditioning in existing buildings has begun. Chicago and Cincinnati are also close to the break-through level. And other cities are moving up fast . . .

To put this thought in a nutshell, those who compete for manpower or consumer dollars will do so at an increasing disadvantage without air conditioning.

As a matter of fact, I strongly suspect that in this era of clerical shortages, air conditioning right here in Washington is attracting employees from non-air conditioned buildings.

Having spent a considerable part of my life in the financial world, I am acutely aware of the economic motivation behind a decision to install a central air conditioning system. I know that the decision is not made primarily because an air conditioned environment is pleasant. No chief executive officer could justify the expenditure on that basis alone. His decision must be predicated on a dollars and cents pay-off.

Problems faced by the Federal Government in this respect are no different than those faced by private industry and commerce. You have, first, the enormous task of recruiting and training manpower. Then, with a heavy investment in a trained labor force, you can't afford to lose it. And finally, you have a budget, and costs are rising, and taxpayers are pleading for relief.

As a direct result of air conditioning a structure, the economic returns come in the form of lower labor turn-over, less expensive recruitment, fewer employee errors, less time lost, and a higher level of output. These represent the pay-off . . .

Do you remember the heat wave that struck Washington in the summer of 1953? Day after day, Federal employees were sent home early and I have a pretty good idea of their working efficiency long before they were released. I examined some clippings from our files. On the second of August, the *Washington Star* reported, "More than 25,000 employees were allowed to leave work yesterday between 1 and 4:30 p.m." And the next day: "More than 13,000 had been excused before 2:30 p.m. and the movement was still in progress." To some degree this story is repeated year after year.

Turning now to private industry, I recall a survey of 75 manufacturing plants by a New Jersey industrial designer which showed that a typical employer lost $108 per man per year from the effect of hot weather if his plant were not air conditioned. And Sylvania Electric, Inc., on the basis of records kept in its Shawnee, Oklahoma, plant, has informed us that in addition to significant decreases in absenteeism and labor turnover, the productivity gain in summer per employee was 7% following installation of air conditioning . . .

What does it cost to own and operate air conditioning? About five years ago, the former Commissioner of Public Buildings, W. E. Reynolds, made a study which showed that if employees save seven minutes of effective time out of a total of 480 minutes in a workday, the employer can break even on air conditioning. Incidentally, seven minutes is about two trips to the water cooler.

Mr. Reynolds' estimates are in line with our own. We have found that the average annual cost of owning and operating an air conditioning system in an office building runs from $60 to $70 per employee. To offset this would require a very small increase in employee efficiency—one to two per cent . . .

The government has completed a number of physiological, psychological and clinical studies showing the effect of comfortably cool working and living conditions upon military personnel. These have invariably pointed to the superior performance of men quartered in conditioned surroundings . . .

I understand that one government agency—the General Services Administration—is responsible for the management of about 7,000 existing buildings. There is no doubt in my mind that the vast majority of these buildings will be air conditioned before very long, along with many other government structures.

This will represent an important investment of taxpayers' money which should result in improved productivity and reduced costs of absenteeism, turnover, recruitment and training. It is absolutely necessary that such an investment be made efficiently . . .

Let me repeat that air conditioning at its best is far more than just cooling or heating. It is temperature and humidity control. It is the cleansing and circulation of air. It is ventilation. If you have air conditioning at its best, you have all of these and you have them simultaneously.

The tight money situation that prevails today and the utter necessity for combatting inflation is without question a challenge to both industry and government. And, of course, many people hold that the one answer is "stop spending." I cannot go along with this. But I certainly do believe that every purchaser should make sure that he gets his money's worth. Obviously, if such an approach is taken, smaller expenditures and reduced expenses are the inevitable result.

The basic position which I am taking today is that air conditioning is a good investment—that it pays off. Accordingly, the government has both a direct and indirect interest in our industry and its products and services . . .

Other Papers

Due to lack of space, and in some cases the unavailability of text, all papers presented at the Symposium are not presented here. These papers include: Address of Welcome, Sinclair Weeks, Secretary of Commerce; Air Conditioning of Government Owned Buildings, Franklin G. Floete, Administrator of General Services Administration; A User's Viewpoint, J. G. Jewett, Vice-President, Prudential Insurance Company; Importance of Physical Surroundings in Public Employment, John W. Macy, Jr., Executive Director, U. S. Civil Service Commission; Air Conditioning of New Construction, Leon Chatelain, Jr., President, American Institute of Architects; Housing, C. E. Sigety, Deputy Commissioner, Federal Housing Administration.

In addition, the program included a panel session not reported here at which the panelists included James Morris, Chief Engineer of Repairs, Public Buildings Service, General Services Administration; George A. Grimm, Chief, Utilities Operation Division, Properties and Installations, Department of Defense; Cecil Boling, President, Treasurer, and General Manager, Dunham-Bush, Inc.; Charles Leopold, consulting engineer, and R. K. Serfass, Vice President, York Division, Borg-Warner Corporation.

Chairmen of the various sessions were H. B. McCoy, Administrator, Building and Defense Services Administration; William H. Aubrey, Vice President and Sales Manager, Frick Co.; George S. Jones, Jr., Managing Director, Air Conditioning and Refrigeration Institute, and George R. Curtis, Deputy Director, Government Industry Equipment Division, BDSA.

BASIC CONDITIONS AFFECTING AIR CONDITIONING IN HOSPITALS

RICHARD P. GAULIN

Hospital Mechanical Engineer, Division of Hospital and Medical Facilities, Bureau of Medical Services, Public Health Service, Department of Health, Education and Welfare

. . . The past five years have seen an increasing trend toward air conditioning in modern hospital design. This was first noticed in the South, where today indications are that nearly all hospitals are including complete air conditioning, and it is now noticeable in all parts of the country. It is a normal trend in a population which is not only accustomed to, but demands cooling for comfort in its residential and commercial establishments. In recognition of the possible benefits of air conditioning the Federal Government through representatives of the various interested governmental agencies, is at the present time engaged in preparing regulations which will permit approval of air conditioning installations for federally owned and operated hospitals located within certain climatic zones.

Hospital and institutional construction today amounts to roughly 3% of the total annual construction in the country. This 3% of total construction plus the unmet bed need, plus replace-

ment due to obsolescence, and the modernization potential of the thousands of hospitals which today are without air conditioning represents a fairly respectable market for air conditioning equipment . . .

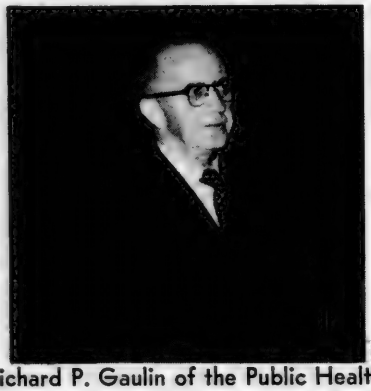
Temperature and humidity control are generally recognized to have definite therapeutic value in the treatment of such clinical conditions as: Head injuries or operations which affect the heat regulatory center of the brain; cardiac conditions which may be adversely affected by the strain of increased blood circulation induced in an attempt to dissipate excess heat; hemorrhagic conditions which reduce the quantity of blood in circulation; thyrotoxicossis or excessive secretion of the thyroid gland which increases basal metabolism; severe burn conditions where large skin areas are damaged reducing the evaporative cooling area; diseases of the liver and kidneys, and many diseases associated with fever. In addition, controlled temperatures, and humidities and air cleanliness are requisites for the treatment of many allergies.

Not to be overlooked is the increasing use of hypothermia in cardiac surgery. During such surgery, body temperatures are sometimes reduced as low as 83 deg F. Special temperature treatment through air conditioning for operating rooms where such surgery will be done will assist in maintaining the body temperature during the operation . . .

In hospital work, air conditioning means the simultaneous control of temperatures, humidity, movement and cleanliness of air to provide constant optimum conditions within the hospital regardless of the season of the year.

I believe it is also of the utmost importance that we bear in mind that the hospital, because of its functions and clientele served, presents many specific problems for the air conditioning system designer not encountered in other contemporary building types. The term comfort conditioning system very often applied to residential and commercial installations does not apply in like manner to the hospital.

In the past there was a natural reluctance on the part of the medical profession, hospital authorities and hospital designer to advocate the installation of warm air heating systems.



Richard P. Gaulin of the Public Health Service presented the paper on Basic Conditions Affecting Air Conditioning in Hospitals.

This reluctance was justifiably based upon the hazard of cross infection and odor nuisance which might result from the general recirculation of air within the hospital. Studies over the years by eminent investigators are somewhat inconclusive but there is sufficient evidence to indicate that airborne infection may constitute a potential hazard. The matter of odor nuisance is well established. With reference to infections in hospitals, it should be noted that the airborne route is only one of the means by which infection is spread, and that numerically the number of infections is comparatively small. However, infections can be serious or produce serious complications, and one infection is too many. Needless to say, the medical profession and hospital authorities take all precautions available to reduce this hazard. We are all aware of sterilization, masking, gowning, handwashing, isolation and many other aseptic techniques practiced in the hospital to reduce infection. However, the fact that pathogenic organisms may be transported through the air complicates the design of air conditioning for hospitals. We like to think of the well-designed system acting as a supplement to the aforementioned aseptic practices of the hospital . . .

The following fundamental information must be considered in any hospital application:

1. The hospital patient, due to his incapacitation or for other reasons, may be susceptible to infections from mild concentrations of pathogens, which would have no effect upon normal healthy individuals.

2. In general, outdoor air used for ventilation if taken from above the roof is comparatively free of pathogenic organisms. Air becomes more contaminated after entering the hospital.

3. Recently the medical literature has contained many reports of the emergence of antibiotic-resistant staphylococci and streptococci. These resistant organisms are unduly prevalent in hospitals and are important as infectious agents.

4. Pathogenic bacteria and pathogenic viruses are the organisms which make indiscriminate circulation of air a potential hazard . . .

Bacteria and viruses which have settled out of the air may be reintroduced into the air by traffic over floors and by many of the housekeeping activities such as: Bedmaking, linen changing, dusting, sweeping, or mopping.

5. Of interest is a report of over one hundred million streptococci found in one ounce of dust collected in a 26-bed hospital ward during an outbreak of streptococcal sore throat and follicular tonsillitis. This amount of dust reflected acceptable housekeeping.

6. Bacteria and viruses depending upon conditions retain their viability for a considerable length of time . . .

Air cleanliness and air movement are the two most difficult problems we face. We speak of air cleanliness when our ultimate goal should be air sterilization. To date we have not accomplished this in a manner that can be applied practically to the handling of large volumes of air . . .

Among the measures which have been used for reducing the hazard of contaminated air are: Filtering, ventilation, sterilizing lamps and bactericidal aerosols.

Of these, filtering and ventilation are the most practical and most widely used in modern hospital practice. Sterilizing lamps have been used to some extent in specific areas of the hospital. Aerosols have seldom been used. For certain very sensitive areas of the hospital, ventilation alone using conditioned outdoor air with no recirculation is preferred at this time.

In general, the areas requiring the most careful study are: Operating and delivery rooms, nurseries, patient rooms, isolation areas, recovery rooms, infectious disease and virus laboratories, autopsy and laundry. Time does not permit discussion of all areas of the hospital but the operating rooms, patient rooms and isolation rooms, are three areas whose requirements may be of particular interest.

In regard to operating rooms, recent medical literature contains many reports of an increase in infection of clean surgical cases. It is the opinion of many medical authorities that such infection is airborne. In view of this situation and because we have been unable to provide air sterilization, ventilation as a dilutent or medium for the removal of organisms is the generally accepted installation for operating and delivery rooms. The following conditions are recommended for operating, delivery, cystoscopic and fracture rooms:

1. Temperature of from 72 to 76 deg as required by the surgeon.
2. Relative humidity of 55% to reduce the hazard of static spark.
3. Ten air changes per hour.
4. One hundred percent fresh conditioned air.
5. No recirculation of operating room air during the time operating rooms are in use.
6. A positive pressure within the operating room to prohibit the entry of air from the corridor or other unsterile areas.
7. Exhaust air taken off from a point near the floor to remove dust and the heavy anesthetic gases.
8. Installation to conform to that portion of NFPA Bulletin No. 56, "Safe Practices for Hospital Operating Rooms," which pertains to explosion hazards.

Because of the ever present possibility of cross-infection, particularly of the respiratory tract and to prevent the spread of odors, it is desirable that air circulation be confined to the individual rooms of this area. However, patient room air may be recirculated through a central conditioning system and be redistributed to the patient rooms with an acceptable degree of safety if properly filtered. A temperature of 75 deg and relative humidity of 45 to 50% are recommended for all rooms of this area.

A minimum ventilation rate of 1½ air changes per hour is recommended for patient rooms.

The isolation unit is used for contagious disease and odorous cases. Usual practice is to provide a negative pressure within the area to reduce the spread of contaminated air. The system should provide for the outboard exhaust of all air. In small hospitals handling few isolation cases, a bypass for recirculation of air may be desirable. This permits more economical use of the area when not needed for isolation cases.

Room unit conditioners of the induction or aspirating type are not recommended for this area because of the necessity for periodic decontamination of the coils.

The three areas just discussed are representative of but a few of the many areas of the complex hospital system and the problems posed by each area.

Hospital air conditioning is a comparatively new field, an unstable field, changing as medical knowledge increases and more efficient equipment is developed.

We in the air conditioning field have a responsibility not only to keep abreast of the changing medical picture but also to incorporate sufficient flexibility in the system, and the equipment used, to permit future adaptation to the changing conditions.

THE ECONOMICS OF AIR CONDITIONING

JOHN E. HAINES
Vice-President, Minneapolis-Honeywell Regulator Company

Today, air conditioning is considered as common place to most of us. But while we have been learning, since the 1930's, to expect it in public buildings and to want it in our homes, many of us still consider air conditioning as less than essential or at least less than necessary.

Only during the past few years have limited studies been conducted to prove that air conditioning is essential in office spaces, hospitals, and manufacturing plants to improve the efficiency, productivity, and health of workers . . .

The Detroit Edison Company made an efficiency study in their drafting room a few years ago. Without air conditioning, 8988 work units required 5008 man hours. Following the installation of air conditioning, 10,474 work units required only 3872 man hours, indicating an increase in efficiency of 51%.

Our Federal Government con-

John E. Haines, who discussed the economics of air conditioning.

ducted a stenographic test in 1946 when stenographers typing triangulation data worked two weeks in a non-air conditioned space and were then transferred to an air conditioned space. Using the same typewriters, their output increased 24%.

C. F. Braun and Company, oil refinery and chemical manufacturers, moved into a new building with air conditioning and reported a 35% increase in the efficiency of 575 white collar workers. However, some of this increase may have been due to better lighting and improved space arrangement.

A task group of mechanical engineers from the Federal construction agencies was appointed in 1954 to determine the necessity of air conditioning in Federal buildings with the cooperation of the Building Research Advisory Board.

In their report, which was issued in 1955, they said:

"Almost everyone agrees that air conditioning is worth while, but concrete evidence by which management can justify it does not appear to be available. Aside from the merits of air conditioning, it is rapidly becoming an accepted necessity.

"Additional work output of employees is not enough. Other factors must also be considered. These include: health, reduced absenteeism, good will, and lower personnel turnover.

"Only quality design and equipment should be considered.

"Central air conditioning will generally cost less than individual room units."

John Hardy & Son, manufacturers of nylon hosiery at Pulaski, Tenn., reported a 29% increase in production after installing air conditioning. The knitting machines required less main-

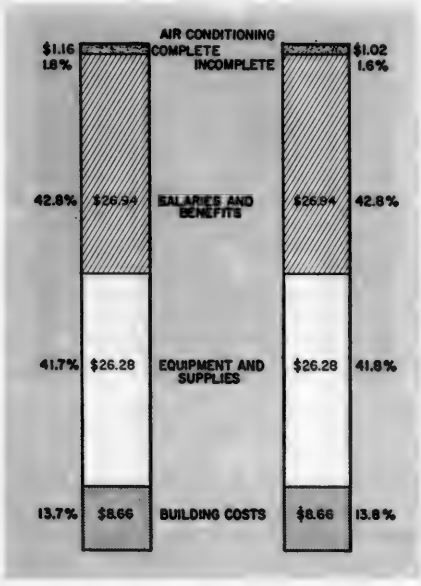


Fig. 1. Annual costs per square foot to own and operate air conditioning system in new hospital buildings — hospital patient area. Improvement in efficiency of workers required to offset cost of complete air conditioning is 4.3%. See text.

tenance, and mantenance costs dropped 80%.

A survey of 75 manufacturing plants in the New York City area indicated that 100 days in each year are so hot or humid that employees either slow down or stop work entirely during part or all of the day, and that an average of $108 in wages is lost each year for each employee working in a non-air conditioned building. Plant absenteeism dropped 25% to 30% after the installation of air conditioning, turnover in personnel was reduced, cleaning costs were lower, and productivity increased.

The Aluminum Company of Canada reported a sharp drop in absenteeism and rate of turnover among employees after air conditioned rooms were used where the employees could rest at regular intervals.

The Elgin National Watch Company reported that their rework decreased 25% after they added air conditioning and that employee efficiency increased.

I believe that in the near future scientific data will be available which will permit us to predict in advance the increased efficiency and productivity of workers, improved recovery of hospital patients, and improvement in the learning of students through the use of air conditioning.

Dr. Brouha, of the Dupont Company's Haskell Laboratory, has been studying the effects of high working temperatures on men for more than ten years and has published reports on the resulting increases in heart rate, blood pressure, and oxygen consumption.

Dr. Brouha's studies, and those of University of Illinois scientists sponsored by ASHAE, have proved that there is no ill effect when a normal person goes back and forth between cool areas and much warmer ones.

Dr. Harmon, of Austin, Texas, has published data which tends to prove that students learn more quickly in a properly controlled environment and this work is continuing.

Nathaniel Glickman has prepared a very complete program at the ASHAE Laboratory in Cleveland which should result in the scientific data which we need to prove conclusively that air conditioning pays for itself in offices, factories, hospitals, and schools. This program has now been started and we will begin to receive reports within a few months.

It is expected that industry in general, as well as heating and air conditioning engineers, will find the results of this research very helpful . . .

Considerable progress has been made in using air conditioning in treating allergic disorders, such as hay fever and pollen asthma, as well as other diseases, and for heat and cold therapy.

In treating patients with rheumatic arthritis, a hot, dry environment of 90 deg and 35% relative humidity has proved to be desirable. Nurseries should be maintained at about 85 deg and 60% relative humidity.

The Health Department in New York City reported that during the hot spell in the summer of 1955, from July third to July ninth, the death rate in the city was 40% above that of the corresponding, but much cooler, week in 1954. The average temperature in 1955 was 82 deg with highs up to 100 deg, and it was 71 deg in 1954 with highs up to 85 deg.

Today, more than half of the hospitals in the country have air conditioning in some form in some area. Within a few years all modern hospitals will be completely air conditioned . . .

Nearly every major office building constructed in the past ten years has included complete air conditioning. More than 60 new air conditioned office buildings have been erected in New York City in the past ten years . . .

Let's look first at the personnel side of the picture.

If you are to retain your trained civil service personnel, the competitive aspects of commercial firms must be considered. Working conditions are an imposing factor today and we see many firms exploiting the fact that "complete air conditioning may be enjoyed by the prospective worker".

Training replacement personnel is a costly process and I understand that many of your departments find four to seven months are required as a minimum to train a new employee.

Even though our study of the economics of air conditioning has not been completed, we have enough information which can be presented now for your guidance in federal building work. We have selected three types of buildings, which are hospitals, industrial areas, and office spaces. In the accompanying charts, the cost of a new building is based upon todays construction costs; the cost of an existing building is based upon one-half of today's construction costs. Insurance and taxes for commercial buildings are estimated at 2% of the original construction costs, except that for public buildings such as hospitals and

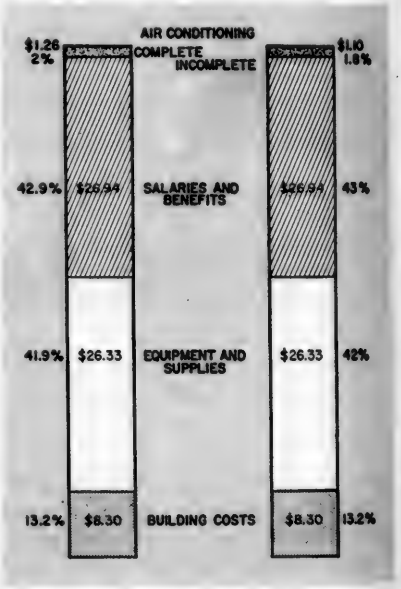


Fig. 2. Annual costs per square foot to own and operate air conditioning systems in the patient area of existing hospital buildings. Improvement in workers' efficiency to offset cost of air conditioning is 4.7%. See text.

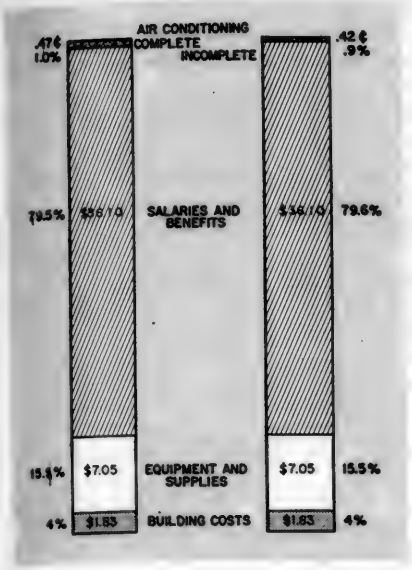


Fig. 3. Annual costs per square foot to own and operate air conditioning systems in new industrial buildings. Improvement in efficiency of workers required to offset cost of air conditioning is 1.3%.

Federal buildings no tax cost is included and the insurance is estimated at 1%.

Air conditioning cost is based upon a central fan system with a twenty year life, as recommended by the ASHAE Guide, with 5% of the original cost added for interest and 2% for insurance and taxes. Again, only 1% is added for public buildings.

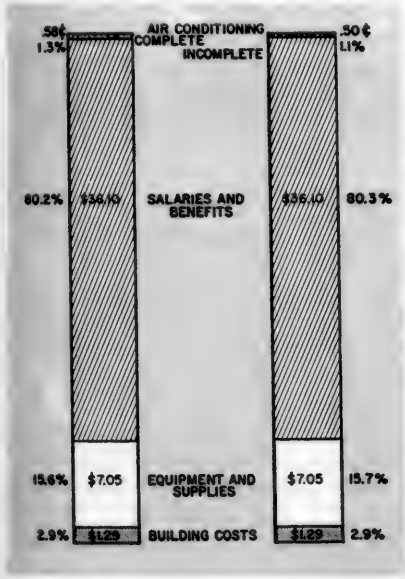


Fig. 4. Annual costs per square foot to own and operate air conditioning systems in existing industrial buildings. Efficiency improvement of workers required to offset cost of air conditioning is 1.6%.

Air conditioning costs do not include the heating costs nor the cost of the heating equipment because we are attempting to compare the additional cost of year 'round air conditioning beyond the cost of a conventional heating system.

These costs are also based only upon outside wall areas. If there are interior areas, then the cost of air conditioning would be less than the estimates shown.

These are average air conditioning costs which have been prepared with the assistance of the Carrier Corporation.

First, let's take a look at the economics of air conditioning in the patient's area of a hospital. This is the area in a hospital where the economics of air conditioning is usually questioned.

(I would like to emphasize again that these are average costs based upon recent experience in all parts of the country and that these estimates may vary somewhat with the design and geographical locations of the buildings.)

In a new hospital, (See Fig 1) the annual cost per square foot of owning and operating the patient's area, including the heating, is $8.66 or 13.7% of the total cost. Equipment and supplies account for 41.7% of the total cost at $26.28 per square foot per year. The payroll in the patient's area is the largest expense and it amounts to $26.94 annually per square foot, or 42.8% of the total cost.

The additional cost of owning and operating a complete and flexible air conditioning system in the patient's area, which is operating 24 hours per day, 7 days per week, is $1.16 per square foot per year or only 1.8% of the total cost. This is 4.3% of the payroll, which means that if the efficiency of those people on the payroll in the patients area is increased 4.3%, air conditioning will pay for itself. There are, of course, other benefits such as the probable more rapid recovery of patients, lower cleaning costs, etc.

Now, if a less than complete air conditioning system is installed in the patient's area, we might assume that the first cost is reduced by 20%. In this case, the cost of owning and operating the patient's area, the cost of equipment and supplies, and the payroll remains the same.

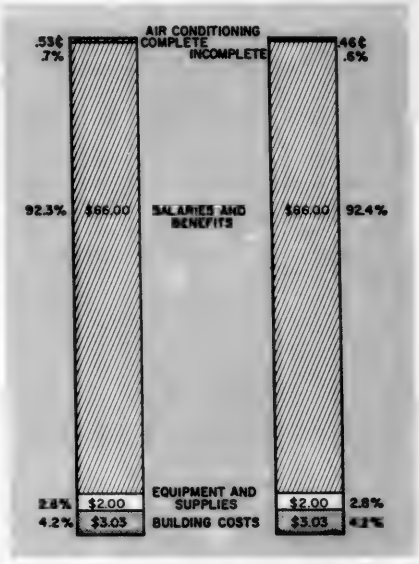


Fig. 5. Annual costs per square foot to own and operate air conditioning systems in new office buildings. Efficiency improvement of workers required to pay for air conditioning is 0.95%.

However, the cost of owning and operating the air conditioning system in the patient's area is reduced by only 14c to $1.02 per square foot per year, and this amounts to 1.6% of the total cost instead of 1.8%. In other words, the total cost would only be increased .2% to install a complete and flexible air conditioning system.

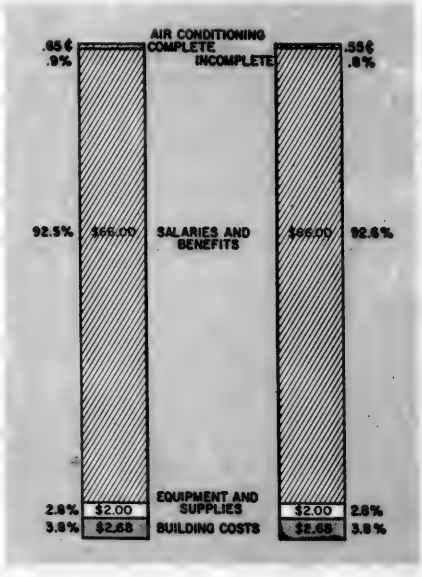


Fig. 6. Annual costs per square foot to own and operate air conditioning systems in existing office buildings. Workers' efficiency improvement required to pay for air conditioning is 0.99%.

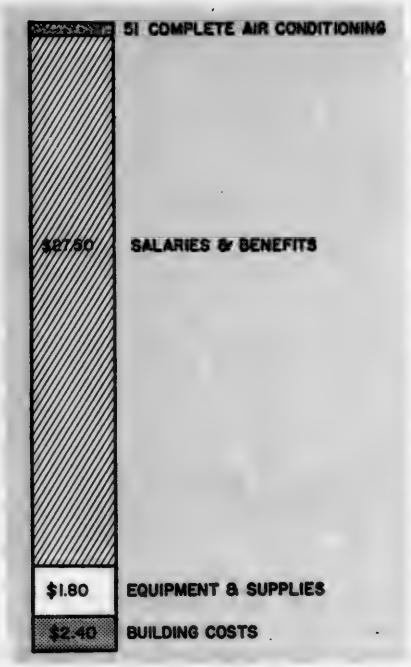


Fig. 7. Annual costs per square foot to own and operate air conditioning systems in bachelor officer quarters. Efficiency improvement of personnel required to offset cost of air conditioning is 1.9%.

In an existing hospital, (Fig 2) the cost of owning and operating the patient's area would be $8.30, equipment and supplies $26.33, and the payroll remains at $26.94 per square foot per year.

The additional cost of owning and operating a complete air conditioning system in the patent's area would be $1.26 per square foot per year or 2% of the total cost. The increased efficiency required for air conditioning to pay for itself would be 4.7%.

If a less than complete air conditioning system is installed at a first cost saving of 20%, the cost of owning and operating would be reduced to $1.10 per square foot or 1.8% of the total cost. Here again, the complete and flexible system only increases the total cost by 0.2% . . .

[*Editor's Note:* Mr. Haines' paper included, in addition to those for hospitals shown in Fig. 1 and 2, bar charts showing the economics of air conditioning new and existing industrial plants (Fig. 3 and 4), and new and existing office buildings (Fig. 5 and 6). The explanation for each of these is similar to that for Fig. 1; consequently, due to lack of space, these explanations are omitted here. The charts themselves tell the story.]

Each chart (Fig. 1 to 7) analyzed a complete and a less than complete system. We have included the less than complete system because we find that some Federal building specifications may permit the installation of this type of system.

The Federal construction agencies task force report mentioned previously also stated that: "Federal agencies policies on air conditioning vary from low first costs, like open windows, to providing as much quality year 'round air conditioning as funds permit."

We believe that there are less than complete systems of all varieties being specified for Federal buildings, and ask that some studies be made to standardize these specifications for all Government agencies and that quality and long life standards be established.

In military construction, the Air Force efforts to provide quality air conditioning are most commendable. Air Force Regulation 91-8 defines the boundries for air conditioning by type of structure, climatic conditions, and type of system.

We find that base theaters, clubs, hospitals, technical, industrial, and operational buildings in certain climate areas may be air conditioned.

Military housing, a vital segment of military life and morale, however, does not receive the blessing of air conditioning, so that our important technical personnel, in all branches of service, do not have a climate for proper rest.

Our pilots in the tactical, air defense, and strategic air commands must be ready at any hour to protect and defend our nation—a 24 hours alert, 365 days, year in-year out. Would economics show us how air conditioning can pay for itself in this area?

Let us look at a typical batchelor office quarters (Fig 7).

In such a typical building, with 10,000 square feet, housing for 50 officers is provided. The cost of owning and operating the building is $2.40 annually per square foot, equipment and supplies cost $1.80, salaries amount to $27.50, and complete air conditioning 51 cents per square foot.

Therefore, an improved efficiency of 1.9% is needed to pay for complete air conditioning for this B.O.Q.

The retaining of trained technical personnel and pilots is important economically to the department of defense. Jet pilot training costs $120,000 per man. Recruiting costs for all services is $44,000,000 annually. Infantry training costs $3,200 per man.

Efficient climate, a permissive atmosphere for learning, a pleasure for families to live in, these are the benefits to be gained from complete air conditioning; benefits which we know our legislators must economically justify . . .

AIR CONDITIONING MILITARY INSTALLATIONS

FLOYD S. BRYANT

Assistant Secretary of Defense (Properties and Installations)

The leadership of the Air-Conditioning and Refrigeration Institute and the Business and Defense Services Administration are to be congratulated on scheduling this conference at this time of the year when Washington's cherry blossoms are in bloom and the weather is mild and invigorating. Under these conditions we are well disposed to consider our subject objectively . . .

Because of our over-all responsibility, the Defense Department is properly interested in the complete year-round control of the temperature, humidity, and quality of the air within structures occupied by military and civilian personnel of the armed forces. Certainly we find complete acceptance of the principle of controlling at least the temperature within structures during the colder months. We find equal acceptance of the practice of installing central heating plants and have come to expect what we choose to call "climate control" in all modern office buildings, hotels, theaters, and similar buildings. And in recent years we have seen a marked trend toward climate control during the summer months. In many parts of the country, summer climate control has become virtually a necessity in business and

office installations and in many industries.

The Department of Defense, in line with this trend, is also making extensive use of summer climate control. We estimate that the value of cooling plants and systems installed in the three military departments is not less than $200 million. The annual maintenance costs to support these systems is approximately $10 million.

As in civilian applications, much of our summer climate control is required to support functions which could not operate effectively without this modern aid. Such activities as precision machine operations, optical shops, research laboratories, underground air defense command centers, and various communication facilities must have cool, dehumidified, filtered air to carry on their functions . . .

In the field of training, too, the Department of Defense may be generally ahead of civilian counterparts in providing means of climate control. Civilian schools and colleges operate on a very reduced basis, if at all, during hot weather, but those in the Department of Defense continue the year around. We believe adequate control of the atmosphere within training structures is an excellent aid to the instructional process, for a number of reasons. For instance, some mechanical and electronic training aids produce enough heat to require cooling even in winter. Then, too, we frequently must accommodate abnormal training loads, with the result that classrooms and other training facilities are often overcrowded. Climate control in these cases can be very helpful in maintaining alert responsive students.

Since training costs in the military departments can be relatively high, it is just good common sense to do everything we can to assure maximum efficiency from such programs. Accordingly, training facilities rank high on our priority list for climate control—but I must acknowledge that a substantial majority of these facilities still don't have it.

Under the heading of military necessity, you might also include the work the Department of Defense is doing in the field of air habitability in submarines and surface ships and in high speed aircraft. Obviously, we have some rather unusual problems in this kind of equipment.

Left to right: Floyd S. Bryant, Assistant Secretary of Defense, Properties and Installations; M. M. Lawler, president of Air-Conditioning and Refrigeration Institute; Frederick W. Mueller, Assistant Secretary of Commerce for Domestic Affairs; and Horace B. McCoy, Director of Business Defense Services Administration, Department of Commerce.

As you know, the *Nautilus*, our first nuclear powered submarine, is capable of cruising for periods of more than a week without surfacing. To do that it needs both climate control within the hull as well as equipment to remove carbon dioxide and other harmful gases from the air within the submarine and to recharge it with oxygen.

In our high speed aircraft, as we approach the "thermal thicket," where friction may generate aircraft skin temperatures ranging into four figures Fahrenheit, we must have an effective and lightweight means of keeping cockpit temperatures within habitable limits.

Thanks to the industries some of you represent, the armed forces are finding workable solutions to these and many other air habitability problems, but there is still room for improvement.

Unfortunately, the same solutions cannot be applied to both ships and aircraft. For example, a number of companies are working on very compact and lightweight equipment for high speed aircraft which takes hot air out of the jet engine itself and through a number of steps—principally compression through rotors operating as high as 100,000 rpm—produces air temperatures of zero or below.

We are always seeking to reduce weight and bulk of auxiliary equipment in ships and submarines, as in aircraft. But the high speed compressors which make possible miniaturized equipment in aircraft produce noise levels that are totally unacceptable in ships. The banshee wail of a 100,000 rpm compressor may make no difference to the pilot flying at supersonic speed, but it would present an impossible noise condition within a submarine hull—not to mention the leads it would provide to an enemy's detection devices.

The Navy is interested in ways to reduce noise and vibration as well as space and weight in all its climate control systems. Navy specifications now call for air conditioning, as a matter of military necessity, in all ships from destroyer escort size on up. Our equipment is not as elaborate as that on commercial liners, for we are not disturbed by variations of a few degrees from one compartment to another. But it is obviously necessary, particularly as we are incorporating more heat-producing equipment all the time, notably in electronic devices. . . .

These matters may be somewhat afield from our discussions here today, but I think they are pertinent for at least two reasons: first, because the Department of Defense needs your help in developing solutions to the problems of climate control in combat equipment; second, because solutions to these problems may prove adaptable for other military requirements and civilian use as well, to the benefit of the industry and the general public.

Business and industry have found climate control in offices and research laboratories an aid in promoting employee morale, reducing absenteeism and employee turnover, and increasing work output. The Department of Defense has reached much the same conclusions . . .

The purpose of climate control in the Department of Defense is solely to improve the effectiveness of the total defense effort. Climate control will not increase our number of customers or the number of those who seek our services. (I might add also that we cannot take a tax credit for capital improvements nor can we deduct operating expenses.)

Use of climate control in areas involving equipment, processing, or other special functions is based on established engineering and other known facts. We have seen rather firm evidence, too, that climate and humidity control may increase employee efficiency in clerical duties and in similar jobs with a measurable output. For example, we can make a study of the work output in such an office before and after the installation of climate control equipment, and figure out on a pure cost basis whether the equipment paid for itself or not. But while we may assume that this example would carry over into other work areas, we have not yet found a way to *prove* that climate control enhances brain power. Does the executive, the engineer, or the scientist think better when the climate is more comfortable? If so, how much better? If we had answers to these questions, the use of climate control might be reduced to simple economics.

Although we do not yet have enough answers to that type of question, the Department of Defense last August established an overall policy to guide the armed forces in planning climate control systems for new structures. Without going into detail on its provisions, we belive it is reasonable in relation to national and local trends. It allows summer conditioning in geographical areas where it had not previously been authorized by the military departments. It represents the best possible balance we could achieve among such factors as requirements, initial and long range costs, and budgetary limitations.

When we try to fit military housing into our policy, though, we run into some rather formidable problems. Keeping in mind that we authorize climate control only when it will improve our military effectiveness, it is clear that housing would normally be accorded a low priority.

I suppose it could be argued that our personnel cannot work as efficiently if they have spent an uncomfortable night in hot weather, but when you have only so much money to devote to climate control I am sure almost everyone would agree that it is more reasonable to apply our resources on facilities which contribute directly to our defense programs.

So far our policy is clear enough, but it gets a little more complex in the case of Title VIII, or Capehart, housing programs. Capehart housing projects, as you know, are privately financed and self-liquidating. It might appear at first glance that we should have no objection to inclusion of climate control in Capehart housing, especially in southern areas. On closer scrutiny, however, we find at least three factors which do affect government funding.

First, inclusion of year-round climate control increases the amount of the mortgage, and the government underwrites mortgage costs. Secondly, the costs of maintaining summer climate control equipment come out of government funds. Third, and perhaps most important, is the impact of air conditioned Capehart housing upon other government-furnished housing without this feature. Since the family in the government-furnished house without climate control gives up the same rental allowance as the one in the Capehart house, we are discriminating against the former unless we provide air conditioning for their quarters too. The single officer living in the bachelor officers' quarters and the enlisted man in the barracks can—and would—voice the same complaint.

Therefore, we feel that any consideration of year-round climate control for Capehart quarters must also include consideration of this feature for all personnel quarters. Frankly, the military budget for this year, and the years immediately ahead, cannot provide the funds we would need to install climate control in existing quarters. Thus we are back to the necessity of establishing priorities, and housing must inevitably be well down the list.

We are not so hard-nosed about this, however, that we will not authorize year-round climate control in Capehart housing when it is shown to be economically feasible. We have made exceptions on projects in areas with low utility rates and low equipment bids. We are also striving to provide conditioning equipment in existing quarters in regions where summer weather can be particularly uncomfortable.

At this time, however, it appears that we cannot hope to extend climate control to personnel quarters on a complete basis for a number of years. Instead, we will continue to stretch available funds just as far as they will go and do the best we can to fill priority requirements . . .

In summary, the purpose of climate control in the Department of Defense is to make possible a more effective defense effort within the resources allotted to us. Your assistance in helping us to meet this objective will, we believe, be beneficial to the industry and to our national security.

GOVERNMENT NEEDS INDUSTRY'S HELP IN SOLVING AIR CONDITIONING PROBLEMS

FRED S. POORMAN

Deputy Commissioner of Public Buildings, Washington, D. C.

. . . In the future, large buildings without air conditioning will be the exception not the rule.

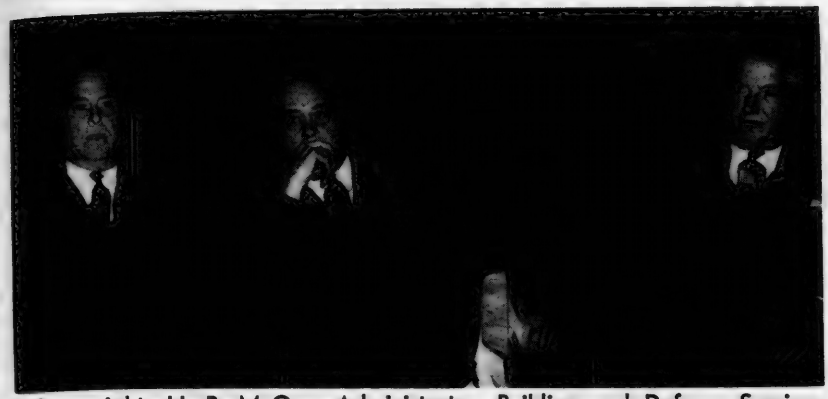
Basically our problem is a fourfold one consisting of:

1. The development of well-documented air conditioning policy together with a program of essential requirements which will prove acceptable to budget officials and congressional committees.

2. Optimum correlation of policies, practices and criteria among the government agencies and the translation of these criteria into suitable designs largely through the use of private engineering organizations.

3. Industry's assistance in standardization.

4. Provision for suitable adequately trained operating and maintenance personnel.



Left to right: H. B. McCoy, Administrator, Building and Defense Services Administration; Sinclair Weeks, U. S. Secretary of Commerce; and Cloud Wampler, Chairman of the Board, Carrier Corp.

While it is true that the government is normally slow to reach full acceptance of innovations that require departure from traditional concepts, particularly where increased costs are involved, the full impact of air conditioning as a necessity in the performance of both our civilian and military missions has placed us—and I am referring to all Government agencies concerned with air conditioning—in a position of having to up-date our policies and procedures applicable to air conditioning.

General Services Administration's success in obtaining funds in fiscal year 1957 to initiate an aggressive program of modernizing and air conditioning existing permanent government-owned buildings and the favorable reception accorded our fiscal year 1958 budget, which included a 5 to 7-year program of up-dating all presently owned permanent facilities selected for retention, emphasizes the importance of well-planned and well-executed preliminary planning.

GSA uses "effective temperature" as a basis for selection of areas warranting air conditioning. Zone *A* under our policy covers areas with effective temperatures of 84 deg and above, zone *B* temperatures of 80 to 84 deg. In our case, these installations will be scattered throughout the country in more than 4,000 locations, many in isolated areas where service will not be readily available, and where maintenance problems will be magnified . . .

The Department of Defense has made significant progress in the development of uniform design criteria for air conditioning. Other Government agencies now actively concerned with the air conditioning of buildings and other special purpose facilities should find it advantageous at this time to sit down across the table with industry—by utilizing the services of the Business and Defense Services Administration (BDSA) of the Department of Commerce and its related industry advisory committee for air conditioning—for the purpose of developing reasonably uniform regulations and criteria for the air conditioning of both new and existing normal type Government-owned buildings. I hope that one of the direct results of this symposium is the appointment of a task group to accomplish this specific undertaking, and I can assure you that GSA will have a keen interest through active participation.

In viewing the long range aspects of the Government's potential workload in designing, installing and maintaining air conditioning facilities during the next 5-10 years (and this anticipated program may well amount to in excess of $1.0 billion throughout all civilian and military establishments), we are now faced with the necessity of developing personnel or employing engineering firms with specialized air conditioning background so as to give proper recognition to a field of work that should not now be incidental and subordinate to the broad field of mechanical engineering and related mechanical trades. I hope that the designing firms and our educational institutions will view this problem of specialization with realism and that Government agencies and the Civil Service Commission will give it appropriate consideration.

We have found it appropriate to employ the services of engineering firms to design the major share of air conditioning for existing buildings. Through the cooperation of the Directorate of Facilities support, ACS/installations, headquarters/USAF, we are also updating the knowledge of approximately 40 of our regional engineers by exposing them to current thinking relating to research, development and design trends now taking place throughout the industry. While our contract engineers would benefit from a well organized industry-sponsored educational program to similarly acquaint them with current thinking, we feel that it is incumbent upon industry representatives to become fully cognizant of our requirements and potential work-load and to actively furnish our regional offices and contract engineers with proper technical data to assure that we get the quality type of air conditioning installations which are essential. I was much disturbed a few days ago to find that the representatives of one of your largest associate manufacturers had never visited our regional office located in his city in spite of the fact that this office is now in the process of designing approximately fifty air conditioned projects for existing Government-owned buildings.

The full impact of air conditioning focuses attention on the urgent need for industry to establish closer and more thorough liaison with architectural and engineering groups in the knowledge that controlled climate within these structures will open entirely new approaches in the use and application of materials, equipment and related building products . . .

Lastly, there is a serious problem of training our present maintenance and operating personnel to meet this new requirement. Many of our buildings are located in smaller communities isolated from other facilities. We must expand the knowledge of our personnel currently assigned to these buildings to insure their ability to operate and maintain air conditioning equipment. The advantages of optimum standardization in equipment, manual controls and both maintenance and operating manuals would be of great assistance to us. We must and will, through suitable on-the-job instructions and supplemental training, meet this challenge. How difficult our task, how well we succeed, and how acceptable air conditioning will prove over the years will depend to a marked degree upon teamwork among the Federal agencies, the design engineers, standardization within industry, and the success of training programs.

FACILITIES AND PROGRAMS OF THE AIR CONDITIONING INDUSTRY

M. M. LAWLER
Vice-President, Worthington Corporation

Ideas brought forth in this symposium will be helpful to our industry, and I hope that what we say here may also be useful to you gentlemen of the Federal Government in carrying forward your plan to broaden the use of air conditioning in governmental operations.

As president of the Air Conditioning and Refrigeration Institute, it is my privilege to tell you something about the industry's facilities and resources.

Our industry has at least four important resources to offer. I want to discuss each of these briefly and try to show how the Government can take good advantage of each . . .

The efficiency of office personnel performing mental work drops sharply after the temperature goes above the mid-70's. At 85 deg there is a 20% loss of efficiency and at 95 deg a 50% loss. In the heat of summer, offices and government agencies without air conditioning often have to shut down work and let employees go home. This means a great loss in man hours.

Moreover, companies or agencies that don't provide air conditioning find it hard nowadays to hire new workers. The economic forecasters insist that this nation is going to have an acute manpower shortage for many years to come. If they are right, the Government will be forced to compete even more vigorously than today to obtain the working staff needed to operate offices and agencies with the same high quality of service. For both industry and government there is a big economic stake in cool and comfortable indoor climate.

The air conditioning industry has important facilities and programs which the Government can use to advantage. The first and most obvious of these is ample manufacturing capacity.

This is a factor of considerable importance. A very large impact of orders would obviously be created by the air conditioning of all Government-owned structures, and it is prudent to ask whether the industry, as presently constituted, could efficiently and economically handle such a volume of business. The answer is yes. Ours is a rapidly growing industry, expanding and adding new facilities in almost geometric proportion. We have the facilities to meet heavy demands and exacting deadlines.

The air conditioning industry is able to offer the technical engineering know-how that comes from the hard school of experience.

I am referring not only to experience in design and manufacturing gained from hundreds of millions of dollars of installations. That is obviously important, but it is something I think we can all take for granted in an industry and that is now more than 50 years old. What I am talking about more particularly is technical skill in analyzing realistically a buyer's actual air conditioning needs.

As manufacturers, all of us have had experience with buyers who come to us with specifications that are sometimes quite unrealistic and involve unnecessary expense. Then when the customer hears the price he nearly faints. Recently a purchaser asked for bids to air condition a large old building. His specs were a model of perfectionism, calling for equipment so elaborate that it included practically everything but gold-plated duct work. When he was told the price, he protested that this was more than the original cost of erecting the building. Yet the price was in no way out of line considering the specifications given.

The moral of the story is that the air conditioning industry has consulting engineers who can help prospective purchasers determine their requirements. It is wise to take advantage of this professional help early in the game. Costs have sometimes been cut very substantially by sensible use of this skill in diagnosing practical air conditioning needs.

It is also desirable to make sure that technicians working on air conditioning problems are experts on the cooling of air and not just heating. Problems of cooling, cleaning and dehumidifying air are, in many respects, very different from those of handling heating units. I can speak on this point with conviction since my own company, Worthington Corporation, is in both fields.

An element of importance to Government buyers is the program of standards being developed by the industry to protect customers, both Government and private.

As manufacturers, it is our obligation to give our customers an honest product, honestly rated, honestly priced and honestly advertised.

The Air Conditioning and Refrigeration Institute has dedicated itself to the task of establishing standards that are fair and workable and at the same time effective. We have those standards now. True, they haven't always been observed as carefully as we would like. The job at ARI is to publicize the fact that they do exist and to encourage all manufacturers, big and small, to design and rate according to those standards and abide by them.

At present, ARI has 39 individual standards and one collateral publication relating to various types of equipment and products. The standards fall into three general categories: Equipment standards; Application standards; and Rating and Testing standards.

The majority of ARI standards pertain to equipment.

These standards are not intended to tell the manufacturer how to build his equipment. They seek simply to measure, in some uniform manner, the characteristics, capacity and performance of the equipment that is built . . .

It is essential to the buyer that he have a dependable yardstick or a "standard" whereby he can compare the capacity of apparatus offered to him by different manufacturers.

The ARI equipment standards and rating and testing standards are designed to give the buyer just such a yardstick.

The ARI standards for room air conditioners and for residential and commercial packaged air conditioners express equipment capacity in terms of Btu per hour at specified temperature levels at which they most commonly operate.

Speaking on behalf of ARI let me urge Government buyers of air condi-

tioning to insist that the equipment comply with ARI standards, especially on such an important item as capacity rating. A series of standards has been developed and is available in room coolers, residential and commercial packaged units and central units.

Naturally, you will ask: To what extent is the industry complying with the standards set by ARI?

We believe that all equipment should be built in strict conformance with the entire code of standards—but in a trade association compliance is purely voluntary. Under the law we have no power to enforce requirements or to punish any who fail to comply. We can't put anybody out of ARI membership because he doesn't build according to our standards.

But there is a great deal we can do —and are doing—to bring about voluntary compliance. We are instituting what we call our "compliance program". This involves a licensing or contractual relationship in which a manufacturer agrees to follow certain test procedures and submit test data to ARI showing that his equipment does conform to our standards. Having done this, he receives the right to use an ARI label or seal stating that his equipment has been built in accordance with standards set by the Institute.

Does such a program have any "teeth" in it? Yes.

Let's suppose someone charges that a unit carrying an ARI seal does not actually conform to ARI standards. In that case, ARI will have the equipment tested by an independent laboratory to determine whether the manufacturer's right to use the seal should be withdrawn. If the tests do indeed show that the manufacturer is not living up to his claims, ARI will have the right to withdraw the seal from him . . .

A final resource of the air conditioning industry is our facilities for aiding important research programs. The effect of climate on weapons, clothing, engines, aircraft installations, aircraft equipment and other items is now being intensively studied in various parts of the country.

At the Detroit Tank Arsenal, for instance, the effect of sub-zero polar climate on equipment, machinery and men is being researched. At the Quartermaster Corps in Natick, Mass., clothing is being tested under all kinds of temperature conditions. At Elgin Field in Florida a "climate hangar" big enough to hold a six-engine bomber has been constructed, where the giant aircraft and its crew experience simulated flight through stratospheric cold without ever leaving the ground. A great deal of work is also being done by the Government on psychological testing of military and naval personnel under extremes of temperature—tropical and polar.

The air conditioning industry is proud of the part it is playing in these research projects. It has helped provide the facilities and equipment—the basic tools—for these and many other scientific studies that are developing information of great value to the users of air conditioning everywhere.

We stand ready at all times to furnish not only manufacturing facilities but experienced engineers and technicians to help develop further research studies.

To sum up:

The control of environment for the comfort and welfare of mankind is a socially important—and economically important task. To meet the swelling demand, one of the fastest growing industries of the 20th century was created. Air conditioning is already a billion-dollar business and it has become fashionable to predict growth up to $5 billion or more in the next decade. . . .

POLICIES AND PLANS OF GSA IN AIR CONDITIONING PUBLIC BUILDINGS

F. MORAN McCONIHE
Commissioner of Public Buildings,
General Services Administration

We are well aware of the need for air conditioning in most of the Federal buildings under our jurisdiction . . . What are we doing about it? What are our ultimate plans?

Generally speaking, we hope to air condition all Federally-owned buildings east of the state of Wyoming except those in the upper tier of New England and in Northern New York, Michigan, Wisconsin, Minnesota and North Dakota. We also include most of the states in the Southwest and the interior of Southern California. We have estimated that it will cost approximately 178 million dollars to air condition the 1,883 existing buildings in this area.

At the beginning of this fiscal year, a relatively small percentage of government buildings in which we have an interest—I would say no more than 10%—were air conditioned. The small share probably reflects the fact that prior to last year, no funds had ever been specifically appropriated for this purpose.

However, last year we were given an appropriation for air conditioning—18.1 million dollars—which enabled us to get a start on our program in fiscal year 1957. Of the total, 4.5 million dollars were earmarked for use in the District of Columbia and 13.6 for use outside.

In the utilization of this appropriation we are concentrating on installations located in the Southern Atlantic seaboard and Gulf States and on larger buildings elsewhere in our target area. We are using some funds to advance plans and specifications for projects which we hope to complete out of our '58 budget.

For fiscal '58, the first full year of our air conditioning program, we have requested 44 million 850 thousand dollars. This amount would be applied, as was our '57 appropriation, against our long-range requirements for some 375,000 tons of air conditioning to be installed at a cost of 328 million dollars.

How long it will take to complete the whole program, or even the first phase of it in which we currently are engaged, depends on how rapidly funds are made available in the government's hard-pressed budgets. We originally thought our objectives could be achieved within seven years. It now seems likely that we will have to revise our planning in order to extend the program over a longer period.

I have been discussing, up until now, our plans and policies for existing buildings only. As for new construction, it is GSA policy to install air conditioning where warranted.

Our present policy does not include air conditioning temporary buildings or rental property. However, we are making air condition-

ing a requirement in many of the buildings which we are leasing as the government's agent.

Although we concentrate on central and not piecemeal installation, the principal deterrent to more rapid progress of our plans is the high cost of air conditioning existing buildings. Each is, of course, a custom job which usually demands the greatest ingenuity and skills from the engineers, contractor and manufacturer concerned. You may be interested to know that it is costing GSA over 6 million dollars to design and install air conditioning in a single structure here in Washington: the South Building of the Department of Agriculture. Although this is one of the more challenging and costly jobs which we must tackle, it serves to illustrate what a single job can do in depleting our limited funds.

As I have said, we plan air conditioning for new construction. We cannot, however, neglect the thousands of Government employees whose work is seriously impaired in prolonged periods of intense heat in existing buildings . . .

We would like to solve another problem which concerns employees—that of educating them to the proper use of air conditioning equipment. We are called upon regularly to investigate complaints about equipment only to discover that its efficiency has been decreased by employee tampering . . .

We must, of necessity, make our air conditioning dollars stretch just as far as they will go. We must also stretch the life of the equipment we install for, unlike private business, we cannot write off air conditioning costs through tax deductions. Therefore we must concentrate, in our planning and purchasing, on equipment which will provide efficient service for the longest period possible. This means we must be alert constantly to new developments—in design, techniques and equipment. We are dependent upon you of the industry to keep us abreast of these developments and to help us to determine the type of equipment which is best for a specific installation or application.

You should bear in mind that, because of the many safeguards which are applied in the use of public funds, projects which involve them often move slowly. Ours are no exception. We cannot, of course, commit funds we do not have but we certainly can and do plan ahead for the day when we have them. So it is important that we know what you are planning so we may take anticipated developments into consideration in the very preliminary stages of our projects . . .

JUSTIFYING AIR CONDITIONING

ROGER W. FULLING

Engineering Department, E. I. du Pont de Nemours and Co.

Industry has contributed and followed with keen interest the activities of the departments of the Federal Government in formulating policies for authorization, design and installation of air conditioning systems. It is well recognized that these policies and instructions represent years of experience and much engineering thought and development. Certainly, many are to be congratulated for their efforts and forward-thinking in this accomplishment. However, much remains to be done.

Industry for many years has had policies based upon its experience and requirements which are subject to change due to our technological and social developments. There is a similarity in the requirements of governmental, commercial and industrial applications. We in industry are well aware of the common application of air conditioning to all kinds of facilities—manufacturing, office, laboratory, and service; and each application has its own particular problems. In Du Pont, we are continually influenced by our immediate knowledge of our own problems and the need for additional research and development data in the engineering and medical fields. The largest investment of air conditioning in Du Pont is for manufacturing areas, where relatively constant atmospheric conditions are required to provide continuity of production and uniformity of required product quality.

Our general policy is to evaluate each problem and decide on the proper solution based on its own economics. There are no set rules or tabulations from which can be selected the recommended system. This is rather basic since in the chemical and textile fiber manufacturing industry, no two processes or even two plants making the same product will necessarily submit to the same solution at a given cost. In the case of office space, lunch rooms, conference rooms and service areas, the pattern more or less follows precedence of installations in operation in our existing plants or in other plants in the vicinity . . .

Since one of the objectives of this symposium is to recognize the current necessity of air conditioning and to develop a better understanding of its value in relation to investment, it is necessary to develop a broad economic concept of air conditioning. We, therefore, accept a definition of air conditioning as a process of treating air so as to control its temperature, relative humidity, cleanliness and distribution to meet the requirements of the space. The most economical system must now be selected to control the required environment.

Lacking the data in the field of fatigue, it has been necessary for the Du Pont Company to initiate its own engineering and medical research studies and I will discuss our activity through temperature control in areas for the relief of fatigue of the worker.

The first step is to determine the type work to be carried on in an area and establish the physiological rate of the people working in that area . . . An engineering medical study should be made covering the total work cycle where the work pattern has not been clearly defined . . . Engineers determine the description of each portion of the work cycle, conduct time studies, and the work cycle. This information is analyzed by the industrial environment group, who, with required assistance from the medical group, determines the metabolic rate in Btu per hour for the complete operation including rest periods. As an example, in the analysis of our problem we assume an existing area having a sensible heat release of about 3,000 Btu per minute. This area has roof ventilators equipped with fans exhausting a total of 8,000 cu. ft. of air per minute and an outside condition of 95 deg dry bulb and 78 deg wet bulb. The resulting inside conditions for several possible schemes are illustrated in Table I.

This tabulation shows the resultant room conditions under each scheme

TABLE I. EFFECTIVE TEMPERATURE VS. SYSTEM DESIGN

Scheme No.	Remarks	Room Conditions				
		Dry Bulb Temp., Deg. F	Wet Bulb Temp., Deg. F	Dew Point Temp., Deg. F	Relative Humidity, %	Effective Temperature†
A	Outside air ..... 8,000 cfm of air exhausted. Make-up air through open windows	95.0	78.0	71.8	47	84.5
B	16,000 cfm of air exhausted. Make-up air through open windows .	116.0	83.0	71.8	26	94.5
C	8,000 cfm of air exhausted. 8,000 cfm of supply air evaporatively cooled	105.5	80.5	71.8	33	88.5
D	16,000 cfm exhaust. Supply, 16,000 cfm evaporatively cooled	100.0	83.0	77.6	48	88.0
E	8,300 cfm air conditioned supply, 7,150 cfm recirculated, 20 tons refrigeration	89.5	80.4	76.6	68	84.0
F	Continued study of economics reducing refrigeration requirements by increasing Effective Temperature from 74 toward 84.	80.0	67.0	60.0	50	74.0

† The maximum permissible Effective Temperature for the 600 Btu per hour metabolic rate involved in this case is slightly below 88.

including the Effective Temperature. I have not indicated dollar values for these particular schemes because costs vary with the location of the plant . . .

[Since the maximum permissible Effective Temperature for a 600 Btu per hour metabolic rate is slightly under 88 the] Effective Temperatures for Schemes C, D, and E are at or below the maximum permissible Effective Temperature. In providing a reasonable safety factor for the Effective Temperature, we design two degrees below permissible maximum. Therefore, either Scheme D or modified Scheme E would be selected, based on final cost of each scheme. With this type of information before them, Management is in a better position to decide which scheme to adopt.

In cases where hot surfaces add radiant heat to the problem, a change in technique is necessary. Professor T. F. Hatch, Department of Occupational Health, University of Pittsburgh, made the following remark on this problem:

"Conditions in industry today are rarely if ever hot enough to be fatal and, by definition, a hot industry or process is one that cannot be made entirely comfortable. The question is: What criteria are to be used to establish the necessary degree of heat control short of comfort but safety and otherwise appropriately below the upper limit of tolerance: The data needed to establish the appropriate limits for different kinds of jobs in industry are not now adequate and it is in this area that further studies in research are needed."

In the radiant heat problem, a globe thermometer is used to take temperature readings. This thermometer reacts to both the mean radiant temperature and to the air temperature as well as to the air velocity and takes approximately 20 minutes to reach equilibrium. Dry bulb and wet bulb readings must be taken on shielded thermometers.

For radiant heat problems in addition to studies similar to those under Schemes A to E, the operation should first be reviewed to consider methods to improve heat conditions, including the following:

(a.) Confine or remove the heat at its source to the practical limit allowed by the process.

(b.) Use shields to reduce radiation when radiant heat is significant.

(c.) In work cycles requiring periodic rest periods, give consideration to air conditioning the rest area, thereby reducing the over-all time-weighted Effective Temperature.

(d.) Use protective clothing and spot-cooling where feasible as complete or supplementary methods. Consider the use of a ventilated suit when the operation is sufficiently confined.

In our studies, the Environmental Engineer in Du Pont and the medical staff at the Company's Haskell Laboratory for Toxicology and Industrial Medicine are working as a team. You may have seen reference to the research work of Dr. Lucien Brouha at this Laboratory. In his experimental research, Dr. Brouha is using two air conditioning test rooms. One room is designed to maintain a dry bulb temperature from + 40 to 120 deg F and from 20% relative humidity to 95% relative humidity. The other room is designed to maintain a dry bulb temperature from −10 to 200 deg F with a dew point from −10 to 110 deg. Both rooms are arranged similar to a wind tunnel in that an air velocity up to 20 miles per hour can be maintained past the subject . . .

With the use of these facilities, data are being developed which

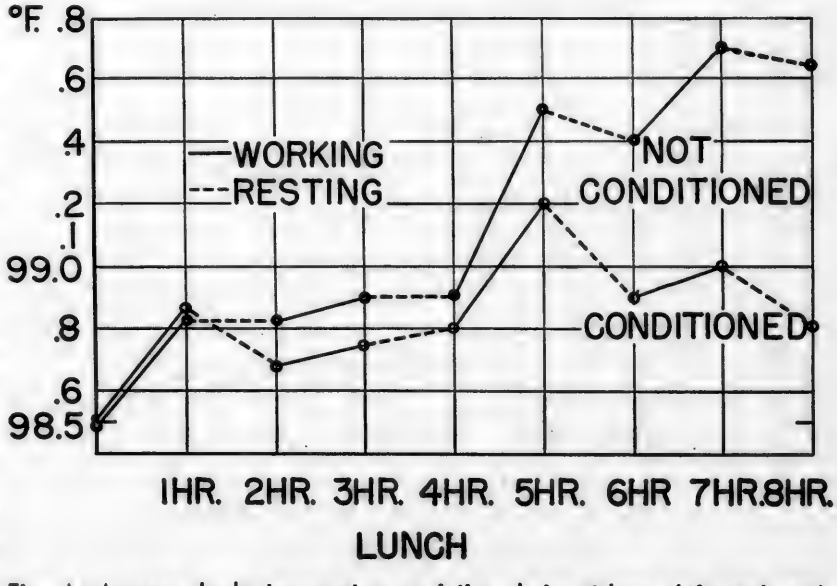


Fig. A. Average body temperature variation during 8-hour shift, with and without air conditioned rest rooms.

will contribute to the improvement of working environment and reduction of fatigue for a given job. One interesting study was the confirmation of average body temperature variations during an 8-hour shift with and without air conditioned rest rooms.

Fig A shows a definite improvement in average body temperature variation through the use of the air conditioned rest rooms. One of the widely believed ideas about air conditioning is that our bodies suffer if we go back and forth between cool areas and much warmer ones. Dr. Brouha's studies effectively discount this belief. In fact, advantages in terms of employees' health and morale may well become a big plus value of air conditioning with refrigeration.

Fig B shows average heart rate recovery curves after work and at rest with and without air conditioned rest rooms.

Fig C shows heart rate before, during and after a standard exercise for various environmental conditions.

Where the worker is subjected to heat stress, the Environmental Engineer must be able to answer two questions:

(1) For a given job, what is the maximum thermal environment that is physiologically permissible? Consideration must be given to temperature, humidity, radiation and wind velocity.

(2) For jobs where the rate of production is not fixed by mechanical limitations, how is the maximum allowable work-rest pattern, as determined by physiological criteria, affected by the thermal environment?

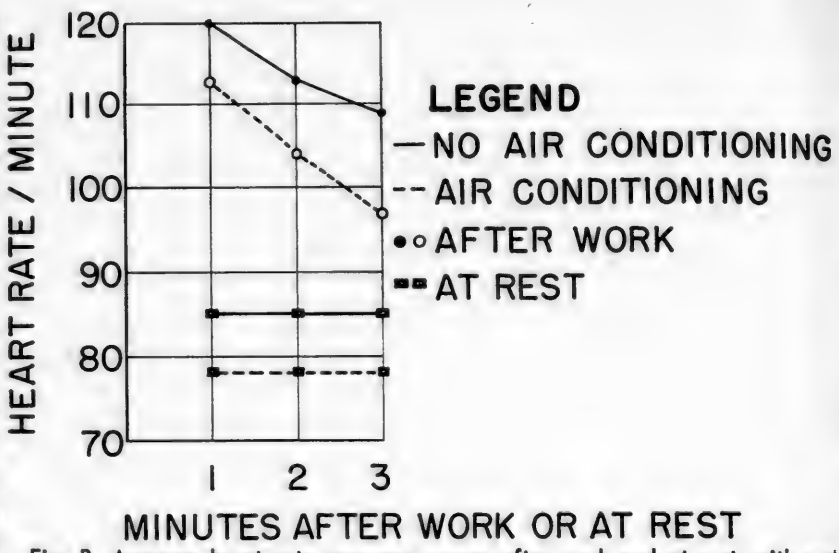


Fig. B. Average heart rate recovery curves after work and at rest, with and without air conditioned rest rooms.

Du Pont has an experiment under way to study the fundamentals of heat stress as a first step in providing a quantitative method of answering these questions. Further experiments will be required in which *more variables are considered*, and *the assumptions of the current experiment are tested* and revised if necessary. The results of heat stress investigations must be put into a form suitable for engineering use.

Work load problems are the specialty of methods and standards engineers and heat load problems the concern of environmental engineers. The medical and personnel departments are responsible for the proper selection of workers. The successful solution of the heat stress problems requires co-operative work by engineering personnel and medical specialists.

Engineering and medical personnel in Du Pont are working as a research team which consists of a management engineer, an environmental engineer, a statistician, and a medical doctor.

The benefits we expect to derive from a thorough study of the heat stress problem are:

(1) The health and safety protection of workers will be improved by defining the limits of excessive heat exposure.

(2) Major cost reductions should result from having the means with which to evaluate the economics of alternative solutions to heat stress problems.

(3) Improved employee relations will be fostered by establishing rest allowance on a more tangible and consistent basis. . .

In closing, I would like to leave this thought with you. With the present fast-changing technology of process and building materials, with forecasted manpower shortages and changing social conditions, and facing the Nuclear Age, Industry and Government for a long time to come must continue to research, develop and evaluate each air conditioning problem and decide the proper solution on its own merits and economics.

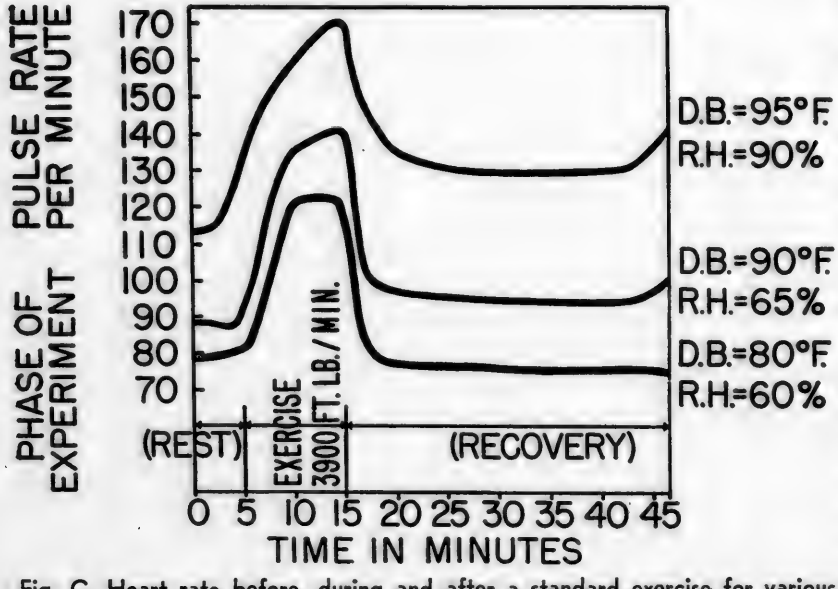


Fig. C. Heart rate before, during and after a standard exercise for various environmental conditions.

LOUIS BLENDERMANN ON

PIPING AND PLUMBING

Drinking Water Systems

ADEQUATE drinking water facilities have an important place in every new building being erected. The proper placement of fixtures for dispensing water is given considerable attention by the architect and the engineer. In most cases, drinking fountains or drinking water stations, as they are sometimes called, are located within easy reach of the major groups of persons working at each floor level.

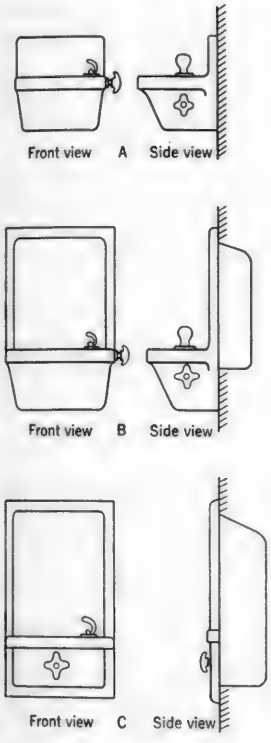


Fig. 1. Three styles of drinking fountains — exposed, semi-recessed and fully-recessed.

In general, the drinking fountains are placed in corridors, kitchens, work spaces or other prescribed areas where they will be centrally located for the groups of persons using them.

Classification of Drinking Fountains

Drinking fountains are available in many different types and forms to fit the most diversified needs. In addition, drinking fountains are manufactured from many materials, including vitreous china, enameled cast iron, stainless steel and aluminum. To limit the scope of this article, attention will be directed only to drinking fountains that are normally installed in the corridors of say a school building. Figure 1 illustrates the three basic types of fountains that might be utilized in such areas.

Exposed Type. Detail *A* of Fig. 1, represents the exposed type of drinking fountain. This unit is fully exposed and projects into the corridor. It is supported by means of bolts fastened to the wall construction.

Semi-recessed Type. Detail *B*, shows a drinking fountain that is partially recessed in the wall construction. Only the bowl portion of the fountain projects into the corridor.

Fully-recessed Type. When it is desired to avoid any projection in the corridor, the fully recessed type of drinking fountain as shown in *C* is used. This particular unit is completely recessed in the wall construction with nothing more than the flange or edge of the unit projecting into the corridor.

The units illustrated may be used with the regular cold water system or a chilled water system, as will be described later.

Electric Water Coolers

Water is most palatable when it is chilled. In climates where it is warm year-round, the temperature of the

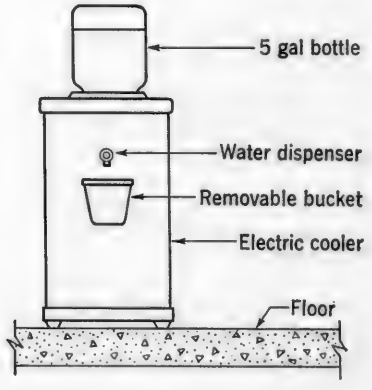


Fig. 2. Detail of self-contained water cooler.

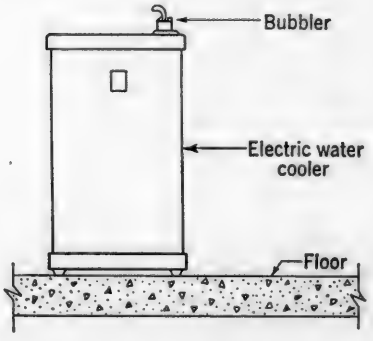


Fig. 3. Detail of electric water cooler.

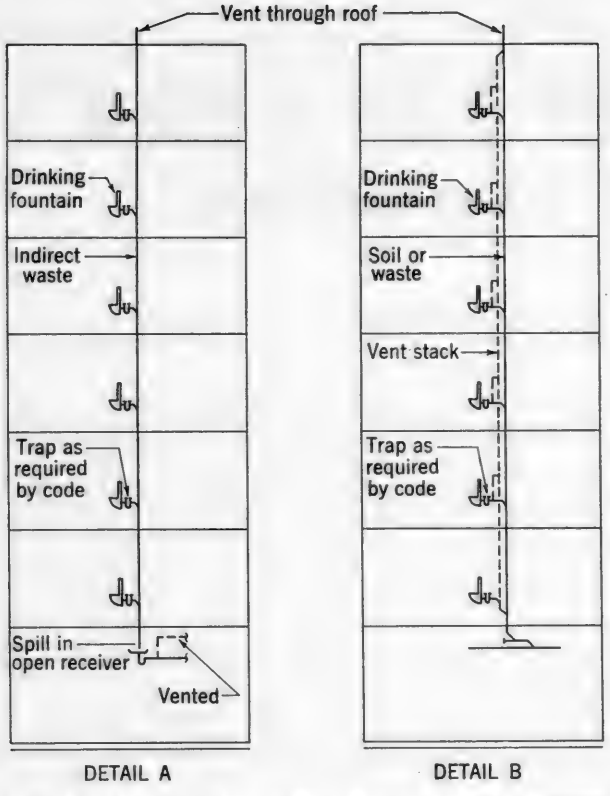


Fig. 4. Methods of installing drinking fountain waste systems.

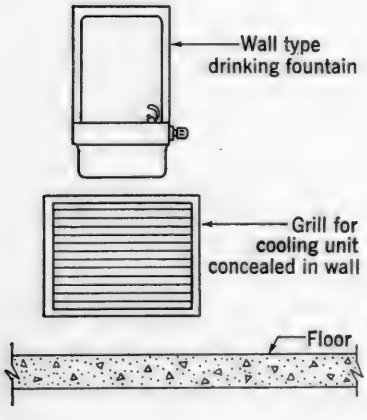


Fig. 5. Typical arrangement of drinking fountain and concealed water cooler.

water supply is also high. In temperate climates, the water becomes palatable during the winter months but loses this desired feature during the summer. Therefore, in order to maintain the drinking water at its most suitable temperature, water coolers are used. A basic type of water cooler is featured in Fig. 2.

This unit consists of a 5 gal bottle of water and a self-contained refrigeration unit. A removable bucket is attached to the front of the unit to catch water spillage. No connections to water or drainage systems are required. The unit is operated, merely by plugging the electric cord into a power outlet. The big advantage of this drinking fountain is that it can be set in any desired location.

The next step in electric water cooler development is the type that connects to the water and drainage systems of piping, Fig. 3. This unit is somewhat similar in shape to the one shown in Fig. 2, with the exception, that the 5 gal bottle has been omitted and the means of dispensing water has been replaced with a bubbler. This unit must be placed where water and drainage facilities are available. Different styles are offered in such a unit. The unit can be supplied with either hand or foot controls to activate the bubbler. In addition, several modifications are available in the manner of dispensing the water. Glass fillers are a typical example. Further modifications include a storage space in the unit for food or bottled liquids. More recently, a new innovation has been added that will dispense hot water for coffee and tea.

This type of drinking fountain can be placed in an exposed position in the corridor or can be placed in a recess when it is provided. When required, the unit can be so arranged to supply another station with chilled water. To do this, a unit like Fig. 3 is placed on one floor and one of the units shown in Fig. 1, is placed on the floor above or below. The electric water cooler will supply the other station with sufficient chilled water.

Roughing

As detailed in Fig. 4, the drinking fountains can be connected to either an indirect system of waste piping or to a system of piping that also serves other plumbing fixtures.

Detail *A* of Fig. 4 shows the components of an indirect system of waste piping while *B* shows how the fountains can be connected to a vented drainage system. The piping, of course, may consist of cast iron, galvanized steel, galvanized wrought iron or copper materials. For the indirect waste system, an open sink, funnel drain is installed in the basement or cellar to receive the waste from the drinking fountains. The receiver must be vented to comply with code requirements.

Concealed Cooler Units

To fulfill a pressing need in many new structures, manufacturers have devised a cooling unit that can be

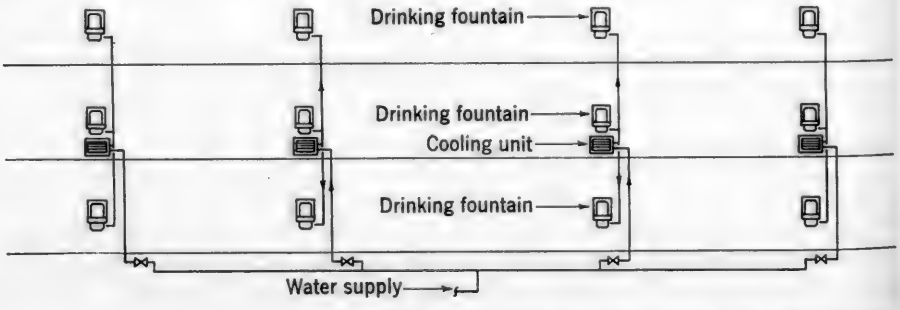


Fig. 6. Arrangement of cooling unit used to serve drinking fountains on floors above and below the installation.

concealed in a wall space. Fig. 5 illustrates this new design trend.

Any one of the three designs shown in Fig. 1 can be used. The cooling unit is concealed in the wall space. The necessary cooling air needed for the refrigeration apparatus is drawn through the screen or louvers placed under the drinking fountain.

It might be timely to mention, that other types of refrigeration equipment is also available for remote location. However, since we are only interested in corridors for this article, the unit shown shall be used for example.

This particular unit has a very distinct advantage for specific locations where it is desired to supply chilled water to drinking fountains on the floor above and below. Figure 6 is a typical example of this application.

Suppose a 3-story school or similar building is contemplated. The cooling water units can then be placed at each of the drinking water stations on the second floor as shown. Water piping can then be extended from these units to the drinking fountains above and below. The drinking fountains are one of the three types illustrated in Fig. 1.

The economy of such an installation offers a good deal of merit especially when the building is expansive in size. Should a taller building be contemplated, a similar installation can be used. For example, if a 6-story building were involved, the cooling units could be placed on the second and fifth floors. The drinking fountains served would then be placed on the floors above and below the cooling units. For given conditions, this system may be regarded as a practical means of dispensing chilled water.

Central System

In many buildings it is both practical and economical to utilize a central system for the circulation of chilled water to the various drinking fountains in the building. For example in this case, we shall consider an office building. A typical arrangement of piping and equipment for a building of this type is detailed in Fig. 7, which shows the location of the drinking water stations on each floor of the building. The water chilling equipment is located in the cellar. When required, this equipment can be located at the top floor or an intermediate floor. The chilled water distribution system extends from the equipment up to the drinking fountains on each floor. At a point at the top of the riser and above the highest fixture, a return line is installed to allow the water to return back to the refrigeration equipment.

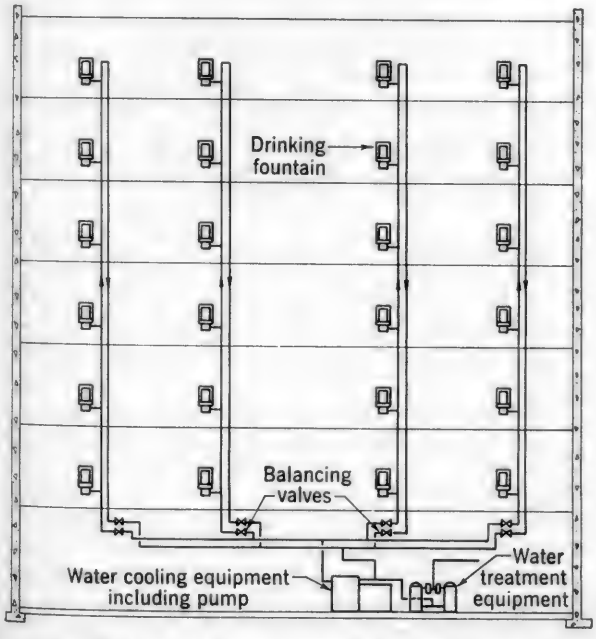


Fig. 7. Typical arrangement of a central system.

In a central system, the chilled water is pumped to circulate the water to each of the drinking fountains. To assure proper balance in the distribution system, balancing valves are placed at the base of the return risers. By the proper adjustment of the balancing valves, it is possible to prevent short circuiting of the chilled water through the risers nearest the refrigeration equipment. Therefore, each valve is throttled until the chilled water circulates evenly through the entire distribution system. This is an important factor to remember because it affords the flexibility in control needed for the equal distribution of water.

There are several ways in which the piping and equipment may be installed for a system of this kind. It is always good practice to consult with the manufacturers of the chilled water equipment in order to make the best use of the various types of equipment they have available for this purpose. When properly installed, this system can be depended upon for many years of satisfactory service.

Figure 8 illustrates the type of drinking fountain that has been used in Fig. 7. It shows the particular arrangement of the trap for this semi-recessed drinking fountain. A cleanout for the trap is placed flush with the wall. Although a water connection is not shown, it is connected to the back of the fountain.

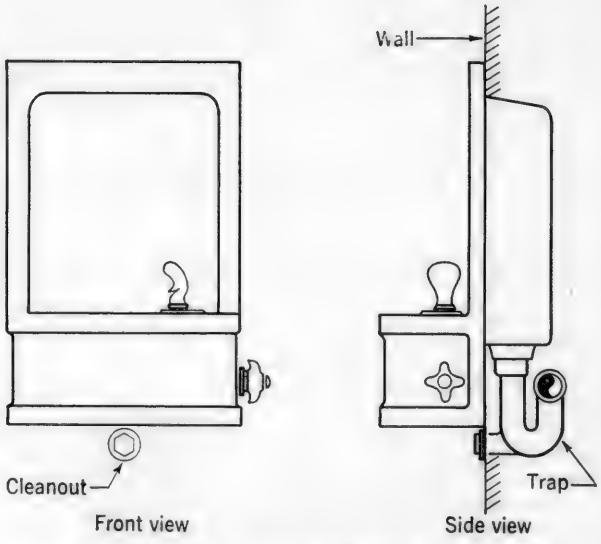


Fig. 8. Detail of drinking fountains used in Fig. 7.

Insulation

In order to retain the desired temperature of drinking water in a central system, the entire piping distribution system should be insulated. Several types of insulation are available.

NEWS OF EQUIPMENT AND MATERIALS

Use the convenient prepaid postcard appearing on the back page for securing further information on new equipment and materials described in this department.

Vertical Circulating Pump

Designed for circulating hot or cold water, condenser water and for booster pump service, the VKY line of vertical circulating pumps is announced by Weil Pump Co., Chicago, Ill.

Presently available in 2, 3, 4 and 5-inch discharges, they require 25% of the floor space of the same size horizontally mounted pump.

Supply and discharge piping are on one side and all operating parts may be removed without disturbing piping connections. Seal may be inspected or replaced without uncoupling piping.

Standard frame NEMA C motor with standard shaft extension is mounted on motor support that is tested for alignment, and flexibly coupled to the pump. Misalignment is impossible, the company states.

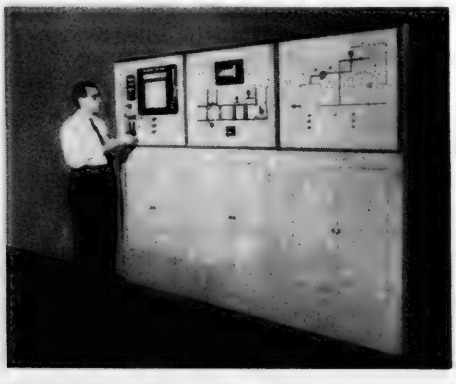
Vibration and noise are reduced by three rubber vibration eliminator units.

More information? Circle Item 1, postcard, back page.

Electronic Control Centers

The latest development in the evolution of its line of electric and electronic control centers for heating and air conditioning applications, the Electronic Control Center, is announced by Barber-Colman Co., Rockford, Ill.

All control components of a heating and air-conditioning system are centralized on a single panel. In addition, the panel performs such functions as the remote indica-



tion, adjustment, and recording of temperatures throughout the building. Each installation is individually designed to meet the precise control needs of the particular application.

A color projection, in miniature outline form, of the air conditioning system may be depicted on the panel with all components indicated in symbolic form and all flow and control lines shown in color. Management and operation of the entire system is then put under the visual supervision of one man.

Mounting of all *off-on* switches, pilot lights, meters, etc., can be put on the panel, each component identified with a name plate. This function is similar to that of schematic illustration described above, and will serve the same purpose on the more elementary systems.

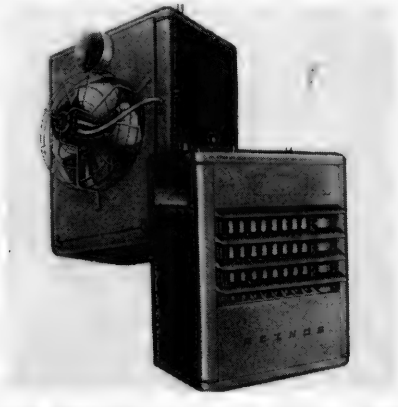
Results should be an improvement in the air conditioning system, a saving of time in operation and maintenance, increased operation efficiency, and reduced operating costs, the company states.

More information? Circle Item 2, postcard, back page.

Gas Unit Heater

A suspended gas unit heater with attractive design, back as well as front, is in production at the Reznor Mfg. Co., Mercer, Pa. It has automatic 2-speed fan control.

All controls are located conveniently in one group within the cabinet, easily reached for installation and service by removing the access panel located on the side of the cabinet. Fan motor is mounted directly to the sturdy wire fan guard.



Company's Flexi-Temp control system, introduced a year ago on floor models, is now optional on the 25, 50, 75 and 100 thousand Btu suspended models. Use of this control system minimizes temperature fluctuation and closely approaches continuous air circulation, the company states. When the fan control is energized by rising temperature in the heat exchanger, the fan comes on at low speed. If the burners stay on long enough to bring the temperature in the heat exchanger to the second predetermined level, the automatic fan speed selector steps the fan up to high speed. At the end of a period of burner operation, the fan automatically slows down to low speed as the heat exchanger cools, thus the air discharged from the heater will maintain a more uniform temperature throughout the cycle.

More information? Circle Item 3, postcard, back page.

Hollow Cone Spray Nozzles

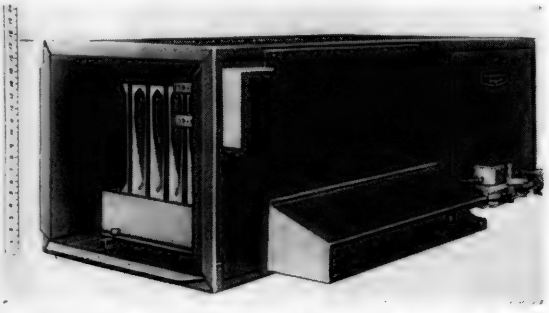
Hollowjet spray nozzles in a wide range of capacities from 1.5 to 1100 gpm, all with a relatively small diameter spray pattern are announced by Spraying Systems Co., Skokie, Ill.

At 40-lb pressure these nozzles produce a spray with a 30 deg spray angle. Made in pipe connection sizes from ¼ to 5 inches in brass, steel, and stainless steel, these nozzles were designed for a wide variety of applications where concentration of the pattern area is necessary.

More information? Circle Item 4, postcard, back page.

Low Horizontal Furnace

Reduction in height is a leading feature of its gas-fired horizontal furnace, produced by Bryant Mfg. Co., Indianapolis, Ind.



Claimed the lowest horizontal furnace in the industry, unit measures 17½ inches from base to top, an especially advantageous feature in view of the large number of homes now being constructed with low-pitched roofs, the company states.

Available in 85,000 and 105,000 Btu per hr sizes, it will operate on natural, manufactured, LP, and LP-air gases.

A slide-in, drawer-type burner assembly gives greatly simplified component access.

More information? Circle Item 5, postcard, back page.

Drain for Compression Tanks

Corky is the name of a device announced by Bell & Gossett Co., Morton Grove, Ill., that drains waterlogged compression tanks without introducing troublesome air into the line.

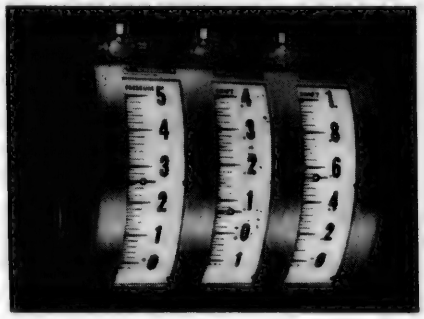
Device is an air vent and treated cork float mounted in a drain plug for compression tanks, and is now standard on all of the company's tanks. To correct the waterlogged condition quickly, one opens the vent, allowing air to enter the compression tank while water is siphoned off through the boiler drain. When the proper level is reached, the cork float drops, signaling through the plug that the vent should be closed.

More information? Circle Item 6, postcard, back page.

Multi-Pointer Draft Gages

Development of a line of multi-pointer draft gages is announced by Cleveland Fuel Equipment Co., Cleveland, Ohio.

Available in 2- or 3-pointer models, they may be combined for multiple installations if desired. The units are used for measuring over-fire draft, outlet draft, first



and last passes, and windbox pressures. With large scales of tanslucent Lucite for interior illumination and large pointers, they are designed to be read from any point in the boiler room with no parallax.

Scales are marked with the designation desired by the customer by means of engraved identification name plates. Vertical design is for space economy.

More information? Circle Item 7, postcard, back page.

Trimmable Filter Material

The U-Trim-It filter, available from Owens-Corning Fiberglas Corp., Toledo, Ohio, is good news to anyone

concerned with the problem of special size filters for room air-conditioners.

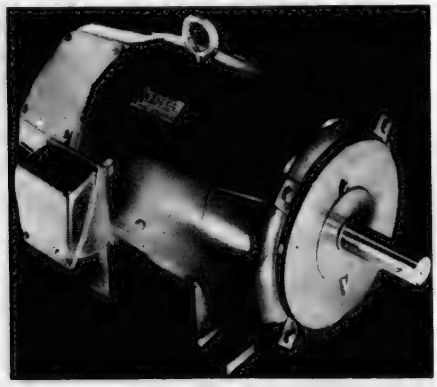
As the photo illustrates, material is easily fitted by simply using the old filter as a pattern, trimming off the excess, and slipping into place in the air-conditioner. The fine glass fibers are produced at a density which provides stability without use of frame or grill.

This new product eliminates the costly warehousing problem posed by the 34 different sizes of standard one-half inch filters, and 191 special sizes now needed for window air-conditioning units.

More information? Circle Item 8, postcard, back page.

D-C Motors and Generators

A line of d-c industrial motors and generators known as Life-Line H series is announced by Westinghouse Electric Corp., Pittsburgh, Pa. They are designed to be equally effective as basic prime movers or as elements of complex automatic production systems.



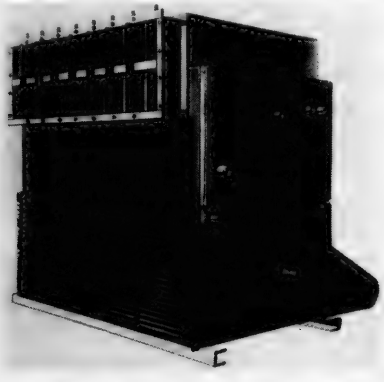
From 1 to 150 hp, ¾ to 100 kw, units have dripproof enclosures and bear NEMA Class B ratings.

Available for the first time in standard industrial motors, the company states, are a high-temperature silicone insulation system in machines rated to operate within Class B temperatures; a controlled ventilation system that draws air from the drive end, distributes flow positively throughout the machine, and expells it at the commutator end; and a new housing construction which enables the dripproof machines to serve many applications which ordinarily require splashproof equipment.

More information? Circle Item 9, postcard, back page.

Multizone Air Conditioners

Flow-Temp multi-zone air conditioning units are specifically designed for buildings in which heating and cooling are required simultaneously, and are constructed so that they can service any one of many different zones



in a building. They deliver either filtered, cooled, and dehumidified air; filtered, heated, and humidified air; or a mixture of both in any proportion, Acme Industries, Inc., Jackson, Mich., announces.

Eight sizes in the line, with capacities from 1,370 to 21,000 cfm of air are available. All sizes have a standard number of zones available, from 6 on the smallest to 22 on the largest. Each available zone consists of one hot air damper and one cold air damper, both mounted on a common shaft in such a manner that when one is completely closed the other is completely open. Each zone is divided from adjoining zones by a divider plate.

All the zones are interconnected by a single, external connecting rod which can be adjusted to the exact job requirements. A balancing plate provides equal air resistance in cases where both cooling and heating coils are required. Double tube steam coils are furnished as standard on all models.

A complete line of accessories is available for all sizes of both vertical and horizontal units.

More information? Circle Item 10, postcard, back page.

Plastic Fan

A centrifugal, non-overloading radial bladed fan constructed of polyvinyl (PVC) to resist corrosion in moving chemically laden air or gases is available from Chicago Blower Corp., Franklin Park, Ill.

First of its kind in industry, the company states, the fan is designed for use in chemical processing operations where coated metal fans may be affected by strong acids. All parts exposed to the airstream are made of corrosion-proof, unplasticized polyvinyl chloride, including blades, scroll, wheel hub and wheel back plate.

Designed for floor, platform, or roof mounting, fan comes in several belt-driven sizes ranging from 12 to 40-inch dia. Performance ranges from 200 to 10,000 cfm, at static pressures up to 6 inches and from ¼ to 10 hp at temperatures to 150 deg F depending on fan diameter.

More information? Circle Item 11, postcard, pack page.

Boilers Rated by Actual Test

Its heating boilers are available with output ratings determined by actual evaporation tests conducted by licensed engineers in accordance with the testing and rating code of Mechanical Contractors Association of America, Inc., Frank Prox Co., Inc., Terre Haute, Ind., announced.

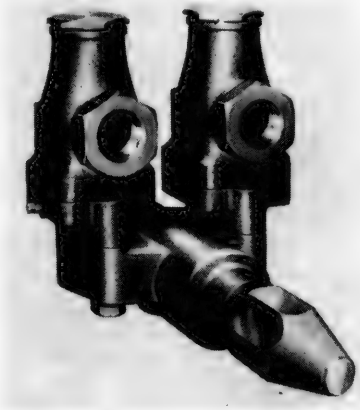
Data furnished with these heavy-duty header type sectional boilers include gross and net Btu output, draft loss, efficiency, heat release, transfer rates, steam quality, and adaptability.

A brochure describing the boilers includes both steam and water ratings.

More information? Circle Item 12, postcard, back page.

Dual Assembly Relief Valves

A new line of safety relief valves designed and constructed in accordance with requirements of the latest ASME and ASA B-9 codes for use on all types of industrial refrigerating and air conditioning installations is announced by York Corporation, subsidiary of Borg-Warner Corp., York, Pa.



The new line of valves is available in standard pressure settings ranging from 50 to 300 psi in 25-lb increments. These valves are suitable for use with all popular refrigerants and are available in dual assemblies that assure the operation of one valve while the other is removed for tests or resetting.

Use of special materials in the construction of these valves prevents corrosion. and sticking due to cold-welding, two frequent causes of valve failure to open at set pressure. Valves are available with ½, ¾, 1, and 1¼-inch inlets.

More information? Circle Item 13, postcard, back page.

3-Inch Aluminum Calculator

Made in Germany and distributed in this country by Silver Bells, Ltd., Oakland, Calif., the Controller calculator is an automatic calculating device for all commercial and technical calculations.

Made of aluminum and weighing only 1 oz with case, the calculator is 3 inches in dia and fits into the smallest pocket. Device does not wear, break, or rust, and accuracy, equivalent to that of a 10-inch slide rule, is not affected by climatic conditions.

Among the functions it performs are multiplication, division, exchange rates, fuel consumption, speeds, percentages, circle calculations, areas, volumes, squares, cubes, and decimal conversions. One hand operation is possible. Cost including carrying case and instruction booklet is around eight dollars.

More information? Circle Item 14, postcard, back page.

Integral Finned Copper Tube

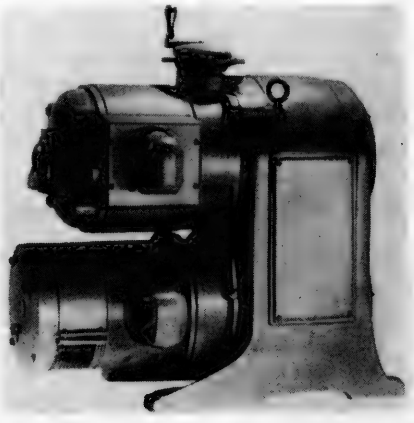
Delivery of its integral finned copper tube, called Readi-Fin, is announced by Reading Tube Corp., New York, N. Y. Type W/H comes in long lengths with plain or finned ends. Type S/T, an extended surface condenser tube, is designed primarily for shell and tube heat exchangers, with ends finned, stripped, or plain.

Integral construction, the company says, minimizes failures that occur due to thermal shock, corrosion, and erosion. Corrugations on the inside wall of the tube result in a higher heat transfer rate than with smooth tube.

More information? Circle Item 15, postcard, back page.

Controls Motor Speed

Any standard NEMA 3-phase a-c induction motor is converted from a fixed-speed into a variable speed drive without removing it from its present installation by Varidyne power unit announced by U. S. Electrical Motors, Inc., Los Angeles, Calif.



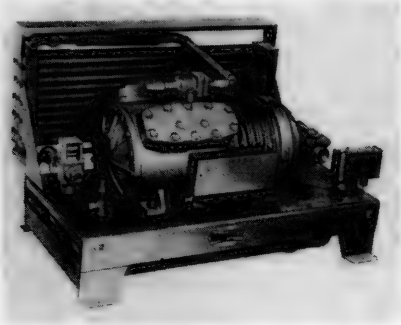
Motor will receive a variable frequency current generated by the power unit. Speeds are changed at the power unit by means of a handwheel, or remotely by mechanical or electrical remote controls.

The ability to convert standard motors into variable speed drives is particularly beneficial for applications where limited space, weight limitations, environmental hazards or other restrictions would rule out the use of other type variable speed drives. Any open, totally-enclosed, explosion-proof or internally geared 3-phase induction motor can be converted. Units are available to handle a total connected load of from 1 to 50 hp with speed variations of up to 5:1. More than one induction motor can be connected to the same power unit, and if they are of the same rating, they will change speeds equally and simultaneously, the company states.

More information? Circle Item 16, postcard, back page.

Compact Condensing Units

With the addition of 5 and 7½-hp condensing units for manufacturers of refrigeration fixtures and for air conditioning applications, Brunner Manufacturing Co., Utica, N. Y., extends its line of semi-hermetic refrigeration condensing units from ¼ through 7½-hp. Compact



size of these new condensing units provides manufacturers with lowered space requirements and allows greater flexibility in end product design. Light weight of these Brunner-metic condensing units lowers shipping costs and reduces handling problems for manufacturers.

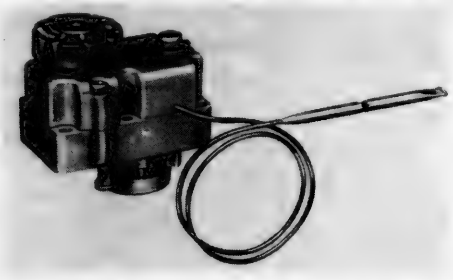
Both units are specially designed for residential and small commercial air conditioning installations. The 5-hp units are 4 cylinder, and may be cooled by air, water, or air and water. All models are available with F-12 for high, commercial, or low temperature applications.

Semi-sealed 7½-hp condensing units, illustrated, are available with F-12 for high and commercial temperature applications, and for low temperature application with F-22. These 6-cylinder units are water cooled.

More information? Circle Item 17, postcard, back page.

Control Added to Gas System

A remote-bulk, snap-action, modulating head for its Adatrol system is developed by Minneapolis-Honeywell Regulator Co., Minneapolis, Minn. The development increases the line's flexibility, the company points out.



Designated T5001, unit can be factory installed on the Adatrol 8V592 gas cock pilotstat or, if a desire for temperature control is not at first anticipated by the user, the unit can be added later on the job. The addition can be made with the six screws provided.

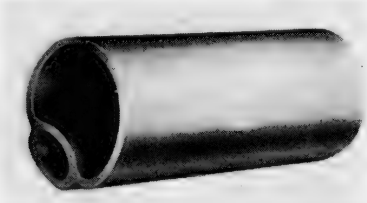
The factory-installed T5001 and C592 are designated the V5157 Adatrol-Modusnap. If a unit is desired that incorporates snap action modulating temperature control without the Pilotstat portion of the C592, then the V5155 may be obtained. This is actually the T5001 Modusnap applied to a valve body without a gas cock Pilotstat.

Modulating head is controlled by a liquid-filled bulb, which is usually placed in the return air space of gas appliances. When a temperature change is required, both pass a pressure change to the valve. The Modusnap head, sensing a need for heat, snaps open to minimum burner rate and then modulates between minimum and full burner rate or snaps off as required.

More information? Circle Item 18, postcard, back page.

Steam-Traced Piping

Lower cost and higher efficiency of steam-traced piping now is possible with Unitrace, unique method of heating pipe lines, developed by Aluminum Co. of America, Pittsburgh, Pa.



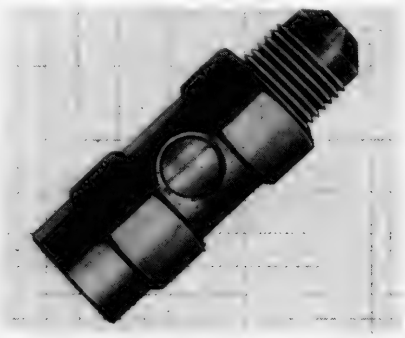
When introduced in 1953 as the first extruded aluminum pipe with an integral steam passage, Unitrace was oval in shape. However, company engineers recently redesigned the one-piece, steam-traced piping with a cross-section matching standard pipe areas. It is available in nominal sizes of 1½, 2, 3, and 4-inch dia.

Immediate advantages to steam-traced piping users are lower cost per foot, and easier, faster installation. In use, the new design boosts efficiency by increasing the transfer of heat internally, and cutting loss of external radiation.

More information? Circle Item 19, postcard, back page.

Liquid Eye Indicator

A Liquid Eye positive sealing indicator, designed for greater economy in mass production, has been developed by Allin Mfg. Co., Chicago, Ill. Model 237 is smaller



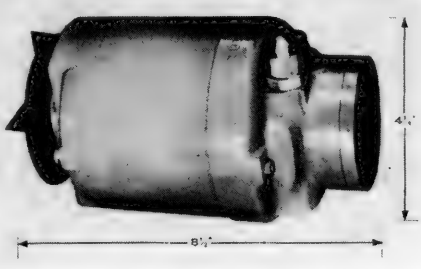
than any previous unit (⅓ smaller in the ⅜-inch male to female size), making it handy for hard-to-get-at places.

A self-contained unit, it is available with either 2 or 3 viewing ports and comes in ⅜-inch male and ⅜-inch female size.

More information? Circle Item 20, postcard, back page.

Pump-Motor-Blower Unit

Developed by Tuthill Pump Co., Chicago, Ill., specifically to meet the needs of original equipment manufacturers with unusual space and weight limitations, the Powermite Pump and Motor Combination combines a positive displacement internal gear rotary pump, a driving motor, and a cooling blower in a space measuring only 8½ by 4¾ inches.



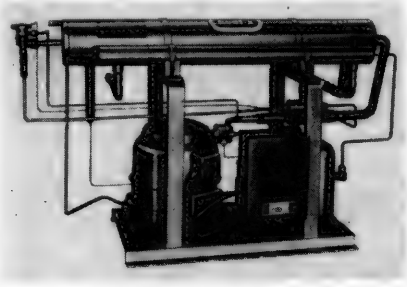
By incorporating the motor and blower into the pump design, company engineers have been able to develop a unit which takes up no more space than a standard electric motor. A single shaft serves all units of the device. Substantial economies for original equipment manufacturers are obtained through the elimination of couplings, other parts, and assembly time and labor costs. The pumps have been successfully used in hydraulic, lubricating, oil burning and other services involving many different fluids.

The unit can be furnished in large production runs in a wide variety of pump and motor combinations. The model illustrated has a capacity of 18 gph at 300 psi and is driven by a 1/12 hp motor at a speed of 1750 rpm.

More information? Circle Item 21, postcard, back page.

Packaged Water Chillers

Completely packaged units for residential or light commercial chilled water air conditioning systems have now been added to its line of heat transfer products by Heat-X, Inc., Brewster, N. Y.



Designed for maximum space saving with peak efficiency, the condenser units feature the company's Inner-Fin construction for greater cooling capacity with a minimum of bulk. All water passages are of non-ferrous construction, eliminating corrosion problems.

Additional features include a fully insulated, metal covered chiller and a hermetic compressor. Also included are the following safety devices: overload protection, compressor starter, factory-set high and low pressure cutouts, manual toggle switch for compressor, and thermostatic control to insure against freezing. Available in 2, 3 and 5-hp models for 230 volt, single phase, 60 cycles, and 208-220 volt, three phase, 60 cycle operation.

More information? Circle Item 22, postcard, back page.

Asbestos Fiber Gasket Material

A group of gasketing materials that have more flexibility, ease of application, and increased durability, have been developed by Industrial Div., Armstrong Cork Co., Lancaster, Pa. The new asbestos fiber materials are unique in several ways. Unlike most conventional asbestos fiber gasketing materials, sharp bending will not cause the new materials to pipe or crack. Their built-in toughness and flexibility permit easy handling and allow for clean die-cutting operations since there are no loose fibers to become detached to contaminate contained fluids or clog orifices.

Unusual compressibility is another characteristic of the asbestos compounds. For example, they seal tightly under considerably lower bolting pressures than those required for hard compressed asbestos sheets.

More information? Circle Item 23, postcard, back page.

Lightweight Hydraulic Bender

A lightweight hydraulic bender that will make a full 90 deg bend in 4 inch and smaller conduit and pipe with one ram stroke is announced by Greenlee Tool Co., Rockford, Ill. According to reports of on-the-job tests made by contractors, the No. 884 Power Bender eliminates costly, time-consuming extra setups usually required when making 90 deg bends on pipe of this size.

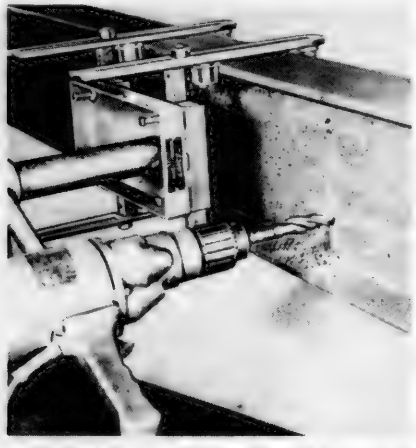
It was possible through the use of high-strength aluminum alloy to make this 40-ton bender light enough for one man to carry the heaviest section with ease. Specially designed pipe supports serve as rollers when wheeling bender from one location to another. Due to its design this bender can be used in any position without loss of operating efficiency.

Regularly operated with the No. 798AC-SA Power Pump, and connected by a quick-coupling high-pressure hose, the device will bend 4-inch pipe through 90 deg in 4 minutes. If higher bending speed is desired the No. 797E-SA pump will do the job in only 30 seconds. Any other high-pressure power pump of up to 10,000 psi can be used with this bender.

More information? Circle Item 24, postcard, back page.

Portable Radial Drill Press

A portable radial drill press for drilling anything, anywhere, eliminates the necessity for handling large pieces, for bringing heavy, unwieldy tools to the job, or for turning the work to be drilled, countersunk, or tapped, says its manufacturer, Lance Iron Works, Chicago Heights, Ill.



Drill is suited for steel erection, all types of construction, bridge and railroad work, and general maintenance. It is designed so that it cannot fall off a work piece under any circumstances.

It is portable, of all-steel construction, easily carried, operated and controlled by one man, swings in a 360 deg radius, is adjustable horizontally or vertically, and clamps and rolls on any size, shape, or type of metal or wood with a sure grip. It is designed for all standard, heavy-duty portable drills, can be used with electric or air-operated drills, and operates in all positions.

More information? Circle Item 25, postcard, back page.

Scotch Type Steel Boiler

A new Scotch type steel heating boiler has been announced by Burnham Corporation, Irvington, N. Y. Readily adaptable to any burner for oil, gas and combination oil-gas firing, it has easy-to-open, hinged clean-out doors both front and rear, for cleaning or replacement of tubes.

There are four washout openings in the lower perimeter quadrant (both sides), two washout openings in the lower part of the front head, and one washout opening in the rear head above a wet-back top. All washout openings have 2-inch brass plugs.

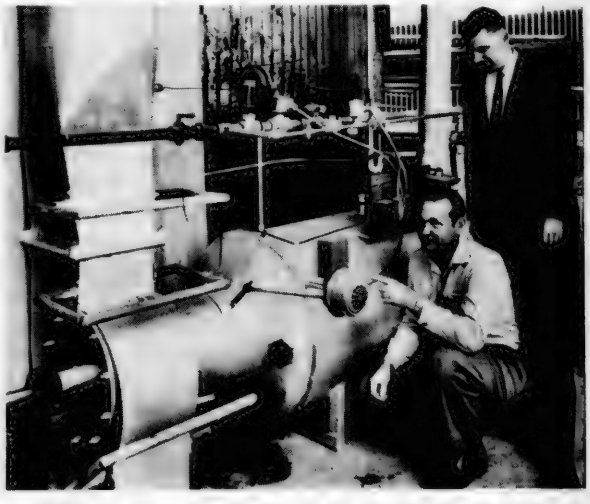
The boiler is equipped with all necessary openings, including those for oil heater, aquastat thermometer and surface blow-off. The company points out that it has more combustion volume at the rear combustion chamber where the gases pass from the furnace tube into the boiler tubes for more complete combustion and efficiency.

These new boilers are supplied in fourteen sizes from a net SBI rating of 4,000 to 35,000 EDR steam, and 6,400 to 56,000 EDR water. They are also available as a package boiler-burner unit furnished with steel skids for easy handling. Boiler can be fitted to any induced or forced draft combustion equipment.

More information? Circle Item 26, postcard, back page.

Vapor Disposal Unit

A vapor disposal unit constructed to reduce air pollution by incinerating hydrocarbons to remove objectionable vapors and fumes from the atmosphere is developed by Hirt Combustion Engineers, Montebello, Calif. Unit



meets requirements of the Los Angeles Air Pollution Control District, which insists that combustible fumes be removed from plant discharge gases.

There are five basic components, a blower, motor, exhaust stack, hood collection system, and an incinerator. Fumes are sucked through the incinerator by a blower, which then disposes of the remains after incineration. Prior methods usually consisted of a blower sucking off the fumes and pushing them through an incinerator. Often satisfactory, the cost of blower maintenance was excessive, due to excess vapor condensation cleanout labor.

Hood collection system takes up all fumes without taking in an excess of air which would make the fumes too air-saturated to be incinerated economically. Incinerator is designed for minimum combustion volume. To assure a minimum amount of excess fuel, the unit has an automatic throttling control.

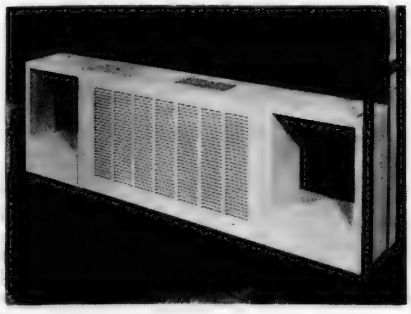
The blower is designed to receive the high temperature gases. For greater economy, the blower is not insulated, because blower gases are discharged to atmosphere.

More information? Circle Item 27, postcard, back page.

Conditioner Has Double Coil

High-capacity double coils are featured in a Yorkaire air conditioner, introduced by York Corp., York, Pa., a subsidiary of Borg-Warner Corp., among 8 models announced.

Four models are high-velocity units, three of which



are wall mounted, two of which, in turn, embody modular construction with book shelves on either side. Four models are of the fan-coil type.

For offices where floor-to-ceiling glass walls are used, a foot-high model is available.

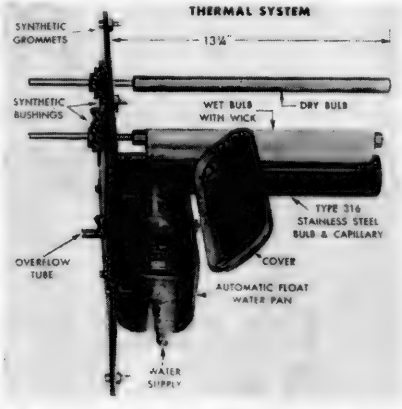
Patented double coil gains in efficiency as a result of a greater secondary coil capacity for a given volume of primary air than is possible with a conventional unit, the company says. The unit is expected to be particularly adaptable to installations where balanced cooling has heretofore been made difficult by the sun's heat on one side of a building.

More information? Circle Item 28, postcard, back page.

Wet Bulb Thermal System

Corrosion and electrolytic damage to temperature controlling equipment are reduced with a wet bulb thermal system announced by The Powers Regulator Co., Skokie, Ill., manufacturer of automatic temperature controls.

System is designed for smokehouses and other uses where the corrosive smoke or gases, plus the galvanic action of the wet bulb water, can cause leaks to develop in the wet bulb.



Basis of the system is a Heliarc-welded stainless steel thermal bulb and an insulated psychrometer panel. The 316 stainless steel bulb is heat-treated, normalized, and polished to eliminate pits where corrosion often starts.

For added protection, the first 15 feet of capillary tubing are also of 316 stainless steel.

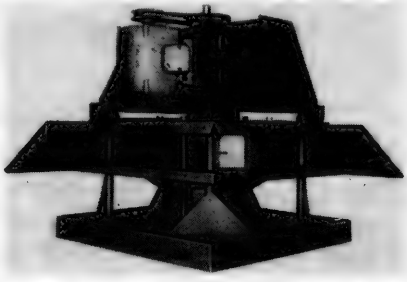
Psychrometer insulation consists of rubber grommets in panel mounting holes, a length of hose in the water supply line, and Bakelite bushings in the bulb-fitting assemblies.

System is available with Series 100 recording, indicating, and controlling instruments, and also as a replacement on present Series 100 installations with copper wet bulbs.

More information? Circle Item 29, postcard, back page.

Centrifugal Power Roof Ventilator

The company's Jet Siphon feature distinguishes the Centrilator, a centrifugal type power roof ventilator, introduced by the Clarage Fan Co., Kalamazoo, Mich. This feature in addition to streamlined air flow are typical of the advanced aerodynamic design which produces a



stable, highly efficient and quiet operating unit. In addition, the ventilator is designed and constructed to give unusually high static pressures (up to 2 inches). It is well suited for those applications where ductwork or hoods may impose considerable resistance, as well as for light-duty applications without ductwork.

Four lifting lugs are on the ventilator to facilitate handling and a pipe is provided for the wiring. Four bolts are all that are needed to secure the unit to the roof. Requiring only a very low curb, the device has a low overall height when installed. It is built in 10 standard sizes with capacities to 26,400 cfm. Weather enclosure is removed in photo.

More information? Circle Item 30, postcard, back page.

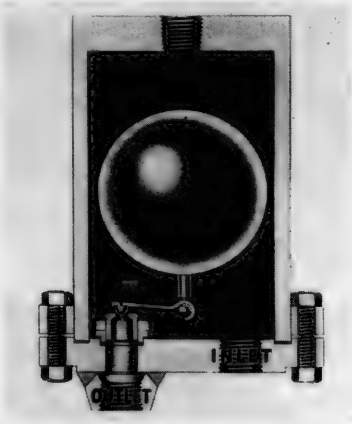
System Upgrades Fuel Oil

In contrast to fuel oil additives which are sold directly to consumers for addition to their own storage tanks, there is available to fuel oil companies from Hy-Test 303 Corp., Rutherford, N. J., a system which includes a new fuel additive, standard fuel dehydrators, and promotion ideas to sell oil. The additive, which is said to eliminate rust and corrosion, nozzle-clogging sludge, sediment, and soot formation, is added through a metering pump, located in the bucket compartment, to each truck compartment in the proper proportions. Dehydration and filtration on the truck then delivers, the company states, a premium grade fuel oil free of foreign matter and moisture.

More information? Circle Item 31, postcard, back page.

Dual Gravity Float Traps

Dual Gravity Traps are designed by the Clark Manufacturing Co., Cleveland, Ohio, for interface service to discharge water or heavy liquids and close for light liquids. The discharge valve is actuated by a stainless steel ball float, weighted to sink in the light liquid and



float in the heavy liquid. These traps also incorporate the company's Duo-Step leverage principle, which uses two fulcrum points to develop maximum power and travel.

The company produces these traps in two series: semi-steel for low temperatures to 300 psi; and, fabricated steel for low temperatures to 1000 psi.

Typical installations include removal of water from gasoline accumulators, settling tanks, evaporators and pipe lines carrying light liquids with water present.

More information? Circle Item 32, postcard, back page.

New Features on Big Boiler

The most recent addtion to a host of features on the biggest boiler, Model 630, in the line of Bryant Manufacturing Co., Indianapolis, Ind., is an ASME coded pressure relief valve. It will be standard equipment on all 15 sizes of the boiler model which range from 888,000 to 3,996,000 Btu per hr.

The only optional extra on the boiler model is a low voltage room thermostat. Shipments from the factory include all components required to fill a specific heating need, no matter what gas is specified or whether it is a steam, water, or vapor system. The boiler controls, specifically produced by the company for their own products, can be installed on either side of the boiler.

More information? Circle Item 33, postcard, back page.

China Wall Fountain

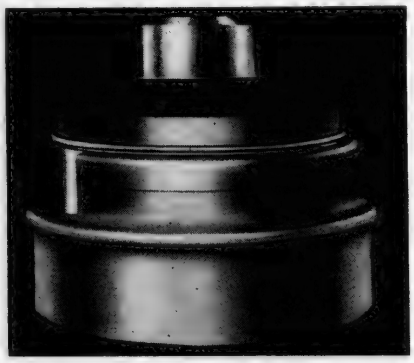
A vitreous china wall-hanging drinking fountain of streamlined design, the Rockbrook, is announced by Kohler Co., Kohler, Wis. It features a wide apron, making the fountain both easier to clean and giving it a

modern look. Measuring 12 x 12 x 16 inches, the fixture has an 8-inch back for wall protection. Unit has a non-squirting, self-closing valve adjustable for continuous flow. It is also equipped with automatic volume regulator.

More information? Circle Item 34, postcard, back page.

In-Duct Centrifugal Atomizer

To provide winter air conditioning by the addition of humidification to a duct heating system, a motor-driven centrifugal atomizer that is installed in the duct is available from Walton Laboratories, Inc., Irvington, N. J.



Because an extremely fine vapor is produced, all the moisture introduced into the duct is absorbed without leaving droplets usually associated with sprays.

To install, a water line and an electrical connection to the main blower through a humidistat control is needed.

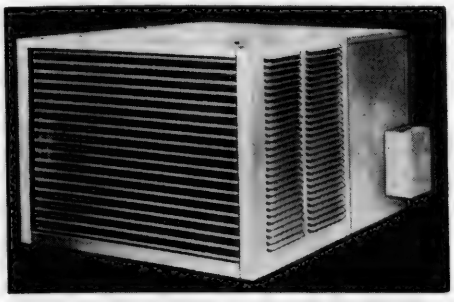
Model WJ, with maximum output of 12 lb per hr, will condition approximately 2,000 cfm warm air supply, the company states. Model WT has double that output. Model WTM is for a multiple installation; has trough built into the duct to replace individual water reservoirs.

More information? Circle Item 35, postcard, back page.

Conditioner Stresses Flexibility

A Stowaway air conditioner for a low cost central air conditioning system is introduced by Crane Co., Chicago, Ill. Unit comes in 2 and 3½-hp sizes, as a complete package for both residential and commercial summer cooling.

One of the advantages of the air-cooled conditioner is its flexibility of installation. It can be mounted out of doors and ducted into the basement, to tie in with a warm



air heating system; can be installed in the attic to distribute cool air through a separate duct system; or can be mounted in a window or through an outside wall, with the condenser on the outside and the cooling coil on the inside.

Both models have 2 compressors, allowing 2-stage cooling. They are shipped factory assembled, wired, charged, and tested.

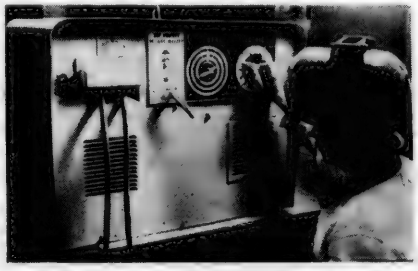
Accessory ductwork packages, sized for either 5 or 7 rooms, are available for use with the air conditioner. Each package includes all necessary insulated ductwork, plus individual room ceiling diffusers and a central return air grille filter.

More information? Circle Item 36, postcard, back page.

Motor-Generator Welders

A new line of motor-generator welders, featuring prelubricated, sealed bearings, controlled current peaks, and space-saving design, is announced by Welding Dept., General Electric Co., Schenectady, N. Y.

The welders are designated WD30AE and WD40AE. An improved magnetic starter with fast response, bimetallic thermal overload relays prevents motor burnout in the event of motor overload. The relays will kick-out in less than ten seconds in stalled single phase, and in



less than eight seconds if the rotor is locked in normal three-phase position.

All bearings, which are rubber-mounted for quiet operation, are over-size for longer life. A unique air bypass in the intermediate bearing housing and a dust cap on commutator and bearing stop dust contamination.

Built with push-button controls, the new units include generator, driving motor, and accompanying controls, all encased in a weather-resistant, self-ventilated case. The new welder-generators can be used for virtually all industrial applications, including light, medium, and heavy d-c arc and inert arc welding.

More information? Circle Item 37, postcard, back page.

Portable Welder Weighs 65 Lb

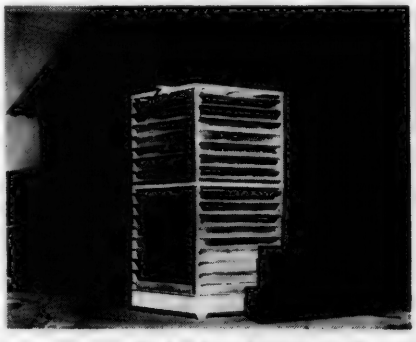
Power Arc Corp., Peoria, Ill., has introduced a line of small, compact, portable welders which are designed for general maintenance and repair work. They carry a full two year guarantee, operating on a 50% duty cycle.

Model 200A delivers 200 amps on 230 volt lines and 180 amps on 115 or 208 volt lines. Weighing just 65 lb, it has a maximum 25 volt output which permits contact or arc welding, giving excellent penetration. This low voltage output completely eliminates the danger of electrical injury.

More information? Circle Item 38, postcard, back page.

Bolt-Free Cooling Towers

Bolt-free construction is featured in the Series S natural draft cooling towers built of redwood and steel by the Dover Manufacturing Co., Independence, Mo.



The tower can easily be knocked down for installation in hard to reach spots, and entire unit can be erected in 20 minutes using only a screwdriver. Basin is one piece, leak-proof unit of hot-dip galvanized steel; crown and tie-rod are also hot-dipped to prevent rusting. Louvers are of clear, all heart redwood.

Natural draft towers are available in sizes from 2 to 225 tons. The company also manufactures the same model but with all steel construction (Series K), to meet municipal fire codes.

More information? Circle Item 39, postcard, back page.

Home Comfort Unit

Announcement of its forthcoming Airline complete air conditioning system for residential application is made by Ingersoll Conditioned Air Div., Borg-Warner Corp., Kalamazoo, Mich.

Illustrated, the package contains a 135,000-Btu lo-boy

gas-fired furnace, a 3-ton evaporator coil with air-cooled remote condenser and compressor, and an electronic air cleaner and automatic humidity control. Overall dimensions of the basement unit in inches are 26½ wide, 50½ deep, and 58½ high.

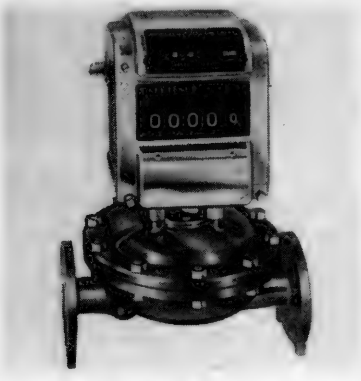
Production will also include both air or water-cooled models in 2, 3, and 5-ton units. Price of the system to its dealers, the company states, is under 900 dollars.

More information? Circle Item 40, postcard, back page.

Stainless Steel Liquid Meter

Based on the company's positive displacement principle, this new stainless steel meter makes it possible to obtain close metered control over corrosive solutions and chemicals which must be kept pure. Available from Neptune Meter Co., New York, N. Y., and virtually immune to chemical attack, the meter will maintain its high accuracy over long periods of service in batch mixing and general process work.

Meter casing and measuring chamber are Type 316 stainless steel. The gear train is mounted outside the meter casing and is completely isolated from the liquid.



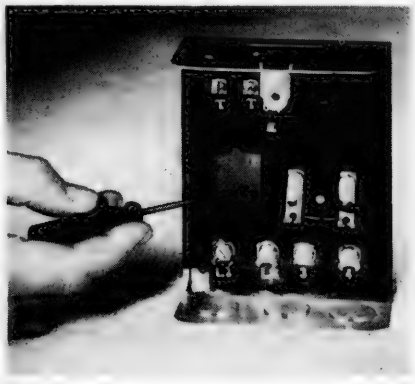
Because of this, the meter has only one moving part exposed to the metered liquid. This means less chance for inaccuracies caused by corrosion or corrosive wear of gears, pistons, or other complicated mechanisms. There is no need to drain and flush the meter for periodic shutdowns just to protect the gearing.

Capacity of this 1½-inch meter ranges from 20 gpm minimum to 100 gpm maximum for most liquids. It is available with a choice of the company's direct-reading, ticket-printing or Auto-Switch registers. In the latter, an electric switch is automatically actuated when a predetermined quantity of liquid has been delivered. This switch can be used to operate valves, pumps, or signals.

More information? Circle Item 41, postcard, back page.

Cooling Compressor Control Relays

A step toward standardization of cooling compressor controls is seen by Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., in its development of a new line of all-purpose switching relays. Company engineers said the fact that the new relays give precise control of relatively high current by a low-amperage thermostat



makes it possible to control residential cooling compressors and other loads of between ½ and 2 hp at a much higher level of sensitivity than with line-voltage and remote bulb temperature-sensing controls.

One model, R847A, has a built-in transformer, the other model R847B, comes without transformer. Both are designed for use with low-voltage thermostats, and a third model, R447A, illustrated, is available for use with a line-voltage control instrument.

In addition to use with residential air conditioning compressors, the relays are suitable for a multitude of other motor control applications. These include room air conditioners, heavy-duty circulating and ventilating fans, heavy-duty water circulators and multiple convector fan units for hot water heating systems.

More information? Circle Item 42, postcard, back page.

Copper Refrigeration Tube

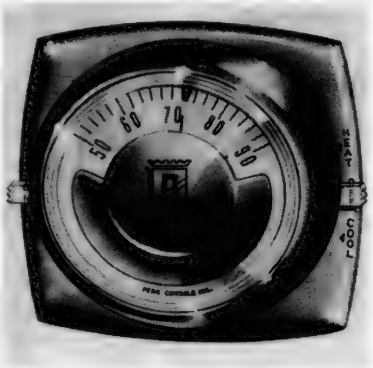
Copper refrigeration tube in 8 sizes from ⅛ to ¾ inch is being produced to ASTM Specifications B-280 by Brass & Copper Tube Div., Triangle Conduit & Cable Co., Inc., New Brunswick, N. J.

Tube is dehydrated, deoxidized, dead soft, bright annealed, end sealed, and available in 50-ft coils. Each coil is packaged in a sulphur-free corrugated carton and color coded. The color code is crimson.

More information? Circle Item 43, postcard, back page.

Accurate, Versatile Thermostat

The Rimset, a striking new thermostat with a large and easily read dial is introduced by Penn Controls, Inc., Goshen, Ind. The thermostat is capable of controlling heating only, cooling only, or both heating and cooling for year round air conditioning.



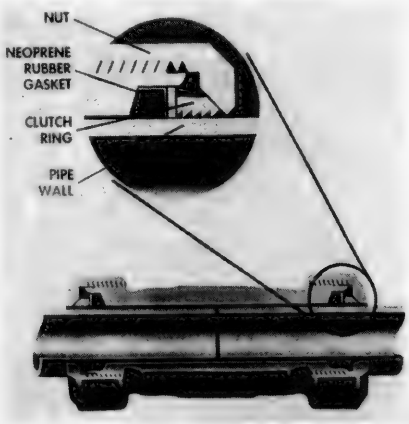
A new idea incorporated in the device simplifies stocking problems and makes reduced inventory possible for wholesalers and dealers. The feature is that the thermostat always remains the same for any system variation. All heating or cooling variations are made in the sub-base, thus allowing the stocking of various sub-base assemblies to meet any customer requirement. Once the user chooses the thermostat for his particular system, all the installer need do is plug the thermostat into the proper sub-base.

An adjustable heat anticipator permits accurate temperature control to within 1 deg F, the company states.

More information? Circle Item 44, postcard, back page.

Threadless Pipe Fittings

Threadless pipe fittings that will withstand traction forces up to 3600 lb and hydro-static pressures ranging from 450 psi on 2-inch pipe to 5000 psi on ½-inch pipe have been developed by Telsco Fittings Division, Dallas, Tex. Fittings are for joining steel, wrought iron, or plastic pipe without threading, grooving, flaring, soldering or welding.



Gripping action is achieved through a brass clutch ring with internal serrations which grip the pipe wall as the fitting nut is tightened while a neoprene gasket is compressed against the pipe wall. A permanent seal against leakage of gas or liquid, and resistance to abnormal vibration, contraction or expansion is achieved. Socket ends and nuts are reamed slightly oversized to accommodate out-of-round and off-tolerance pipe ends.

Fittings are available in couplings, adapters, 90-deg elbows, and tees. Applications include prime plumbing work, plumbing repairs, cuts into existing lines, oil and gas piping, and machinery and equipment lines.

Fittings are made from high-tensile, corrosion-resistant malleable iron to ASTM specifications. They are available in galvanized or Parkerized rust-proof finish. Laboratory controls assure uniformity of elements as well as metal strength and ductility.

Machined-brass stiffeners are available as accessory equipment for joining plastic pipe and tube. This prevents *cold flow*, a characteristic common to all thermoplastics, and holds the pipe wall firm when the fitting nut is tightened. Flared end prevents raw, angular edges.

More information? Circle Item 45, postcard, back page.

Summer Air Conditioner

A blower-coil summer air conditioning unit, Type 917, adaptable for a year-round forced filtered air system, with the addition of an optional heating coil, has been developed by Mueller Climatrol, Milwaukee, Wis.

Designed to operate with remote air or water cooled condensing units, cooling capacity depends on the condensing unit selected and the conditions under which it operates. Capacities are 2, 3, 5, and 7½-tons.

Suited for suspended installation, unit has a centrifugal type blower which can be used with extensive duct distribution. Both blower and motor have permanently lubricated ball bearings. Optional return air grille and air discharge plenum provide a unitary air conditioner for a variety of consumer, commercial and industrial installations.

The cooling coil is a copper tube with aluminum fins. Optional heating coil gives the required heating surface for maximum efficiency under all operating conditions. The continuous-duty motor is equipped with integral overload protection and a variable speed sheave. A multi-blade, centrifugal blower is statically and dynamically balanced to eliminate vibration. Bonderized cabinet is approximately 28 inches wide by 22 inches deep by 41 inches long and is fully insulated with thermo-acoustical, neoprene-faced, spun-glass insulation.

More information? Circle Item 46, postcard, back page.

Air Cooled Condensing Units

A new economy priced line of air cooled condensing units is announced by Typhoon Air Conditioning Co., Division of Hupp Corp., Brooklyn, N. Y. The line was designed specifically for economical unit installation in small stores and offices. Called Thrifti-Kool, the line consists of 2, 3, and 5-hp units, designated TAR-170, TAR-31, and TAR-51, respectively.

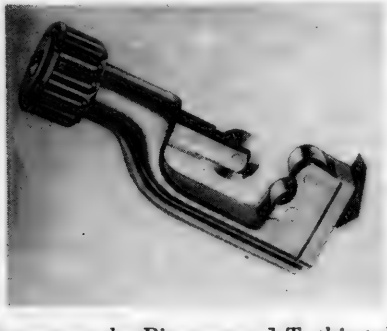
According to the manufacturer, large oversized bearings are incorporated in the design to increase the life of the compressor, and all bearings are finished by diamond boring and micromatic honing. The bearings are permanently lubricated and sealed against moisture, sand and dust to assure long, trouble-free performance without costly maintenance.

Provided with hermetic compressors, the units use Freon 22 as refrigerant. The completely waterless operation is accomplished by using a large-surface, air-cooled condenser coil. Total cooling capacity of units is 18,200, 32,200 and 56,000 Btu per hr respectively.

More information? Circle Item 47, postcard, back page.

Plastic Tube Cutter

A tubing cutter for non-ferrous and plastic tubing and thin wall conduit is announced by The Erie Tool Works, Erie, Pa.



To be known as the Pipemaster 1-T, this tube cutter's range of operation is ⅛ to 1⅛-inch OD. It is designed so that all cuts are straight and smooth without distorting the tubing out of round, and it will operate with minimum effort.

The screw mechanism is enclosed in a precision-made casting so that it is clean and quick to adjust. The safety pivoted reamer swings back out of the way when not in use. The cutter weighs only 10 oz and its overall length is 4½ inches.

More information? Circle Item 48, postcard, back page.

Fan Blades Have Reduced Depth

Model YOX 20-3 fan has been designed by The Torrington Manufacturing Co., Torrington, Conn., to provide reduced axial depth in window fan units while avoiding the vibration and noise problems encountered with conventional offset window fans. The blades of the new fan, while secured directly to the hub, are shaped and

angled back (see illustration) so as to overlap around the drive motor.

The fan is presently available in a 20-inch dia and standard blade depths of 2⅜, 2 31/32, and 3 17/32 inches, depending on performance requirements.

Standard construction is mill-finished aluminum blades, steel spider and rubber-bushed hub; blades are not finished, spider and hub are either zinc-plated or black-lacquered. All blades are statically balanced and individually gaged for contour and alignment.

More information? Circle Item 49, postcard, back page.

Cold Vapor Heating System

A cold vapor heating system, Thermosiphon, in which a gas normally used as a refrigerant is piped through radiator coils in place of water, may provide a new and better method of heating churches, garages, and similar buildings that need only intermittent service. Developed by R. Th. Eichmann, chief engineer of the Swiss firm, Carba, (in this country, International Carbonic Engineering Co., Wilmington, Del.), the system has been tested in several European installations, and patents have been applied for in both Europe and the United States.

Big advantages are stated to be in the speed and uniformity of the heating. The cold vapor system, it is claimed, is six to seven times faster than conventional hot water radiation heating. It can raise the temperature in a building such as a church as much as 34 deg F in 1½ hr, and eliminates the danger of freezing pipes during shut-down periods.

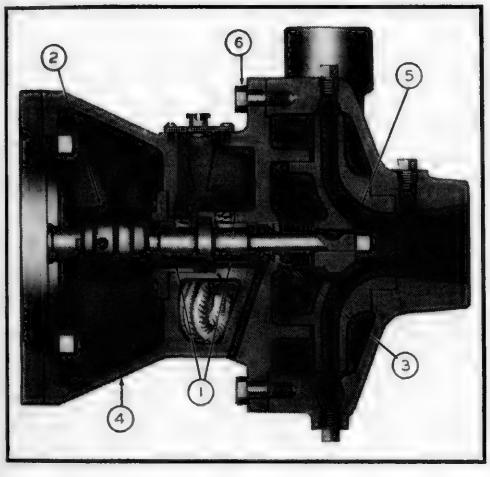
Major difference between cold vapor system and usual hot water or steam radiator heating plant consists of substitution of Du Pont Freon-114 for water in the heating coils, and addition of a shell and tube heat exchanger to the normal coal, oil, or gas-fired boiler. While initial cost of a cold vapor heating system probably would be higher than a comparable hot water system because of additional heat exchange equipment required, the company feels that the system offers greater operating and maintenance economy.

More information? Circle Item 50, postcard, back page.

(*Continued on page* 118)

REALLY Quiet!

...your answer to noise problems in cooling tower installations



In the B&G Series 1522 Pump, noise has been engineered out... together with usual causes of unsatisfactory performance.

The cut-away illustration at left tells the story—

1. Long bronze sleeve bearings in both the pump and motor assure quiet operation.

2. Spring-type flexible coupling makes a noise-dampening connection between pump and motor.

3. "Remite" Mechanical Seal positively ends leakage. Harder than glass—wearproof—self-lubricating.

4. Bearing bracket sub-assembly, including shaft and sleeve bearing, is easily removed and is interchangeable in all B&G 1522 Pumps.

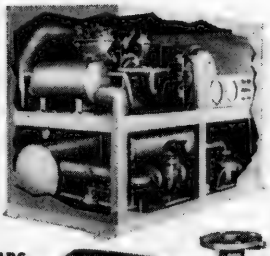
5. Dynamic balancing of the impeller prevents shaft vibration and seal failure. Balancing chamber and relief holes eliminate thrust load on pump bearings.

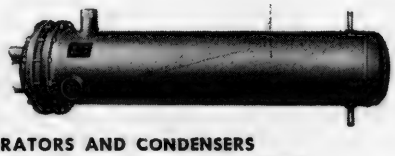
6. Easily serviced. Removal of a few bolts permits separation into three parts.

B&G Series 1522 Pumps are available as all-iron, bronze-fitted, all-bronze or stainless steel units. Capacities to 150 GPM, heads to 115 ft. Send for catalog.

COMPLETE LINE OF AIR CONDITIONING PACKAGE CHILLERS AND COMPONENTS

PACKAGE LIQUID COOLERS
Completely integrated cooling units for apartments, commercial and industrial buildings, process works.





EVAPORATORS AND CONDENSERS
Plus values in efficiency designing—built to ASME Code requirements.

CENTRIFUGAL PUMPS
Featuring exclusive, leak-proof "Remite" Mechanical Seal—*quiet* operation. Ideal for air conditioning installations.

B&G

BELL & GOSSETT
COMPANY

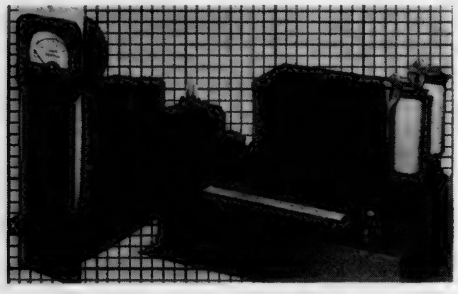
Dept. REU-4, Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, Toronto 16, Ontario

(*Continued from page* 116)

Remote Indicator, Controller

Operation and position-indication of remotely located valves, gates, feeders, or other devices is possible with Synchro-Scan position indicator-controller units developed by Builders-Providence, Inc., Providence, R. I., Div., B-I-F Industries, Inc.



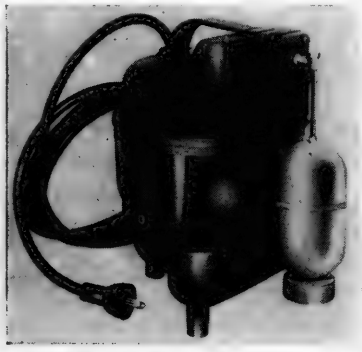
Units permit the remote modulation and continuous indication of valves or similar devices. This is accomplished through the transmitter package, illustrated at left, a plug-in unit which has a 3-position (*open*, *close*, and *off*) switch mounted on its face to control the device. Above this switch is a small voltmeter-type indicator graduated from 0% to 100% to indicate the percent of opening.

At the receiving end, another packaged unit contains the control relays and the regulated d-c voltage supply used to transmit the position indication. A standard electric position transmitter is used to originate this voltage. Two wires and a ground are required for transmission of the signal.

More information? Circle Item 51, postcard, back page.

Replaceable Sump Pump Switch

A time and labor saving boon to users of sump pumps, including contractors, plumbers, and farmers, has been developed by the Piqua Machine and Manufacturing Co., Piqua, Ohio. The company has developed a quick-



change switch that will produce in excess of a million cycles, and is so constructed that if operating difficulty is experienced a replacement switch can be quickly obtained from a jobber and easily installed.

This feature of the Enpo sump pump permits fast and easy service right on the job. The company points out that when operating difficulty arises with any sump pump, the trouble is usually found in the switch. With this switch, the operator needs to remove just 8 bolts, pull out the old switch, and insert the new one. The entire pump need not be returned to the factory for service.

More information? Circle Item 52, postcard, back page.

Hermetic Unit Servicing Kit

Recently announced by Kerotest Manufacturing Co., Pittsburgh, Pa., is the Hermetic Service Kit, designed to service all types of hermetic units with one valve.

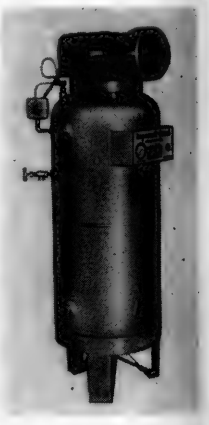
This new kit eliminates the need for a separate valve for each hermetic unit serviced. A master valve is furnished with adaptors and stem extensions to service specific units. This master valve is equipped with a stainless steel stem to provide longer service life, at no added cost.

The kit comes with or without compound gage in a large heavy gage steel box, and it also boasts many other time and cost saving features.

More information? Circle Item 53, postcard, back page.

Packaged Air Compressor Unit

Ingersoll-Rand Co., Phillipsburg, N. J., announces a new air compressor to be known as the Channel-Flo. It is a two stage, 200 psig rated motorcompressor presently available in 1½ and 2-hp sizes.



The complete packaged unit includes the motorcompressor, cushioned rubber mounting on an ASME rated vertical tank, interconnecting piping and fittings and automatic start-and-stop control.

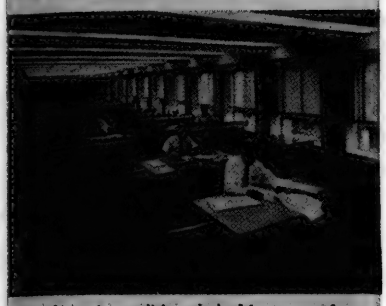
The manufacturer claims important safety and space-saving features in this new unit. Troublesome and hazardous belt drive is eliminated because the compressor is flange-mounted directly on the driving motor. Due to this direct mounting, the compressor requires less than half the floor space of tank-mounted, belt-driven units of comparable size. It can also be mounted on a shelf, side wall or overhead bracket with the air receiver located in an out-of-the-way space.

More information? Circle Item 54, postcard, back page.

(*Continued on page* 120)

Board room of the Board of Trustees

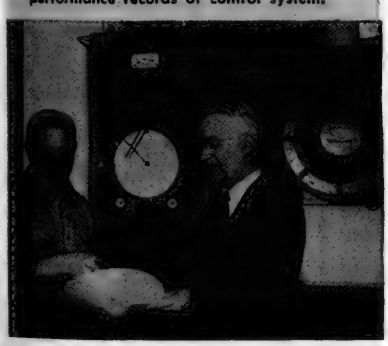
Typical Executive Office



Modern air conditioned drafting room for both plant design and mechanical equipment design sections.

Powers Thermostat and PACKLESS valve controlling chilled or hot water coils in air conditioning unit. Packless valve prevents water leakage and requires no packing maintenance.

Powers Recording-Controller provides chart performance records of control system.



New Administration Building

Metropolitan Sanitary District of Greater Chicago

Architects: **Philip B. Maher and Frank L. Finlayson**
Engineers: **Sanitary District Engineering Staff**
Contractor: **Paschen Bros., Inc.** • *Air Conditioning:* **Carrier Contracting Corp.**

POWERS air conditioning control system helps provide ideal indoor climate with lowest operating and maintenance cost

The Metropolitan Sanitary District was acclaimed by the American Society of Civil Engineers: **"One of the Seven Engineering Wonders of America."** The Stickney Treatment Works, one of its three major sewage treatment plants, is the world's largest and it is still expanding

Administration and engineering of this large organization is centered in the fine modern building shown above. Mechanical equipment here is the best obtainable and it has been well engineered with close attention to important details. Year 'round air conditioning is provided by separate perimeter and interior systems.

In the perimeter areas, air conditioning units are served by a high pressure conduit system. Thus occupants in each individual space may select the temperature desired by adjusting the Powers thermostat inside the unit.

Interior zones are supplied with conditioned air from ceiling diffusers. Here, too, Powers controls automatically adjust temperature to the requirements of occupancy and outside weather.

Consult Powers when you have temperature or humidity control problems for new or existing buildings. You can always benefit from Powers experience gained in all types of buildings.

THE POWERS REGULATOR COMPANY

SKOKIE, ILLINOIS | *Offices in chief cities in U.S.A., Canada and Mexico*

65 years of Automatic Temperature and Humidity Control

(c88)

(*Continued from page* 118)

Machine Mounting Pad

A compact, machine mounting pad called Air-Loc is being used in industry to help reduce machinery noise and vibration. Manufactured by Clark-Cutler-McDermott Co., Franklin, Mass., it is made from B. F. Goodrich Chemical Co.'s Geon polyvinyl resin. The versatile pad is intended for use with such equipment as metal punch

presses, industrial electric motor mounts, printing presses, pumps, machine tools, and similar applications.

The manufacturer states that the pad will reduce noise and absorb vibrations and shock loads. Machine performance is thus improved and machine life is lengthened. Flooring and building structures are also protected.

More information? Circle Item 55, postcard, back page.

Tool Tapers Fiber Pipe

Announcement of a new tool that puts a taper on bituminous fiber pipe so that a contractor can use left-over short lengths of pipe which would otherwise be discarded, is made by Talon Tools, Inc., North Arlington, N. J.

Claimed to be extremely fast cutting, tool in less than 30 sec quickly and easily puts a factory-quality taper of 2 deg on all squarely-cut fibre pipe, the company says.

Steel chuck barrel slips inside the pipe and turning the handle 3 or 4 revolutions moves the sharp, hardened-steel cutter blade over the end of surface to form a taper. A built-in stop controls the depth of cut. The tool is available in two sizes for tapering 3- and 4-inch fibre pipe and also in a power model for use with ½-inch electric drill.

More information? Circle Item 55-A, back page.

Miniature Clutch for Instruments

An electro-magnetically operated miniature clutch designed for use on low torque drive of instruments and miniaturized control mechanisms is announced by Industrial Div., Warner Electric Brake & Clutch Co., Beloit, Wis. The model designation for the clutch is SF-100.

The unit gives instantaneous, positive engagement and release of loads up to 2 lb in (static torque rating).

No slip rings or brushes are required for the clutch since the flange-mounted field is connected through pig-tail leads to a 28 or 90-volt d-c source. In the clutch, torque is transmitted through the rotor to the armature which may be keyed to the driving or driven member. Power required is 6 watts maximum.

More information? Circle Item 56, postcard, back page.

Adds 10, 15-Hp Units to Line

A broadening of its line of air-cooled, self-contained Weathermaker air conditioners is announced by Unitary Equipment Div., Carrier Corp., Syracuse, N. Y. It has added 10 and 15-hp packaged units requiring no water to the air-cooled models previously available in 5 and 7½-hp sizes.

The air-cooled equipment features a low-friction compressor which uses less power at peak loads. The compressor and the refrigeration motor are both lubricated for life and hermetically sealed in a rugged casing to keep out dust, dirt and moisture. Both are readily accessible for servicing.

Designed to move large masses of air at low velocities insuring quiet operation, the fan has ample capacity to force air through duct systems and may be employed at a wide range of speeds without sacrifice of efficiency.

The units have been designed for central or direct air conditioning of stores, business offices, shops, or small industrial buildings. When installed in the space itself, they discharge air into the room at near-ceiling levels.

When used as a central system, the equipment may be located in a storeroom, attic or basement, and the cool, filtered, dehumidified air is distributed through a duct system. If a forced warm air system is used for heating, the existing duct system may also be used for conditioned air distribution.

More information? Circle Item 57, postcard, back page.

(*Continued on page* 122)

TAKE A
BIGGER Share
OF YOUR AIR CONDITIONING MARKET
with
SELF-CONTAINED
Barkow
WEATHER-WISE
AIR CONDITIONERS

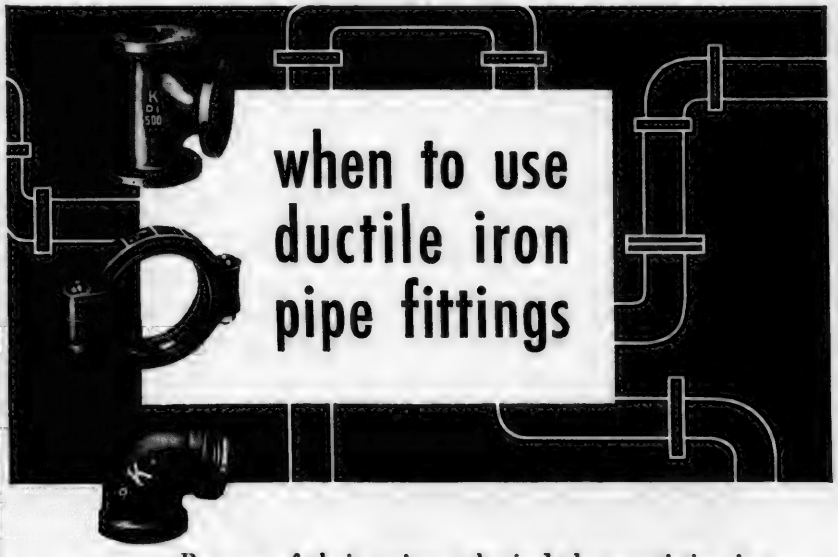
BARKOW
MODEL CK-75

Shown
in Sizes 2 to 7½ Tons
Available with
Water or Air
Condensers

By any standard in design and performance, the Barkow Weatherwise Model CK75 is your top value for commercial and larger home air conditioning. Compact, completely self-contained, it can be moved into an installation with surprising speed. Simple to connect. Complete with high-low voltage panel and pressure controls. Room thermostat controlled. Our low prices are for complete package. No addition for accessories necessary. Write for the complete story on the many features on BARKOW Model CK75 Weatherwise Air Conditioners. Represented the Country over.

AUG. G.
Barkow
MFG. CO., INC.

2231 S. 43rd ST. • MILWAUKEE 46, WIS.



when to use ductile iron pipe fittings

Because of their unique physical characteristics, including high tensile strength and the resistance to shock, rust and corrosion, Kuhns ductile iron pipe fittings are recommended for the following applications:

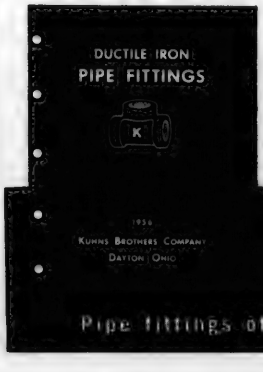
- Where structural strength is specified.
- When high pressure sealing is essential to reduce such hazards as explosion and fire.
- Where wide temperature fluctuations might cause distortion, leaks and weakness.
- When rust and corrosion are problems.
- Where fittings are to be reused.
- To prevent leakage because of vibration, misalignment or wear.

PHYSICAL PROPERTIES OF PIPE FITTING METALS

	Tensile Strength min. psi	Yield Strength min. psi	Elongation Per Cent
Ductile Iron	60,000	45,000	15%
Malleable Iron	40,000	30,000	5%
Carbon Steel	70,000	36,000	22%
Cast Iron	21,000	21,000	0%

As The Kuhns Brothers Company supplies cast iron and malleable iron fittings as well as ductile, these recommendations are made on an impartial basis.

Kuhns ductile iron screwed fittings are listed by Underwriters Laboratory, Chicago, for 300 lb. service; flanged fittings and companion flanges for 500 lb. service. They are easily identified by the "DI" on each.



For additional information, write for our Catalog on Ductile Iron Pipe Fittings.

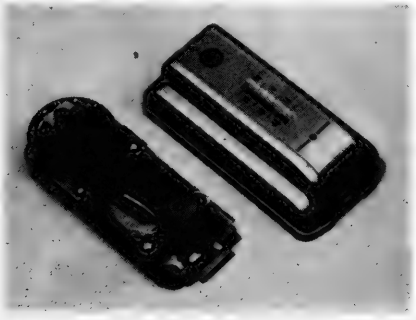
THE KUHNS BROTHERS CO.
1800 McCALL STREET • DAYTON 1, OHIO
Pipe fittings of Ductile Iron, Cast Iron and Malleable Iron

(*Continued from page* 120)

Variable Heat Anticipator

A variable heat anticipator which helps provide even temperature control under extreme weather conditions will be incorporated as standard equipment on all room thermostats according to an announcement by Appliance Control Dept., General Electric Co., Schenectady, N. Y.

Designed to operate with the thermostat, the new anticipating device helps eliminate common complaints



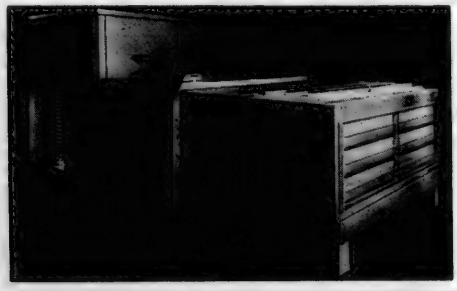
of hot and cold temperatures experienced with some heating systems. The anticipator causes the thermostat to turn the heating system off before the room temperature is too high and to turn it back on before the temperature dips too low.

Versatile from an installation standpoint, the unit eliminates the necessity of matching up a pre-heat resistor with the control circuit. One thermostat can now be used with all 24-volt gas and oil control circuits ranging from .2 to .8 amp. A built-in slider on the anticipator is set at the time of installation for the particular heating system control circuit. Universal in adjustment the new unit can be set with Vernier accuracy to provide an exact cycle time.

More information? Circle Item 58, postcard, back page.

Conditions 16 Zones

A central station cabinet type multi-zone air conditioning unit is announced by Worthington Corp., Harrison, N. J. Available in five sizes, ranging from 4060 to 19,200 cfm, the self-contained year-round air conditioning units offer as many as 56 coil combinations and are capable of air conditioning up to 16 separate zones.



Units circulate, heat and cool, humidify, dehumidify and clean the air. They consist of a fan section, coil section with heating and cooling coils and humidifier, diffuser and damper section, filter box and mixing box.

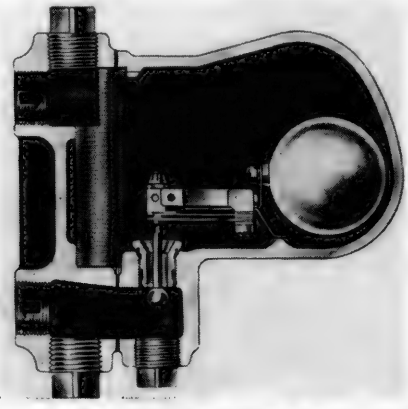
Applicable to installations where a number of zones need individualized temperature control due to differential heat loads, design of the units permit them to meet any combination of the following requirements: cooling only, heating only, cooling and ventilating, and heating and ventilating. Specification sheet containing information on dimensions, component parts, and features is available.

More information? Circle Item 59, postcard, back page.

Single-Valve Steam Trap

A float thermostatic steam trap, called Monovalve F&T steam trap by its manufacturer, Velan Valve Corp., Plattsburg, N. Y., is developed for applications where condensate must be discharged at steam temperature.

While other float-thermostatic steam traps have two separate mechanisms, one operated by a bellows-thermo-



static element to vent air, and the other one by a float to discharge water, this unit uses one valve only to perform both functions, and in addition, the same valve acts as a check valve. The 4-purpose valve reduces considerably cost of maintenance. It replaces 2 seats and valves in standard traps and 3 seats and valves in installations with check valves. It incorporates all features of the bimetal type, guaranteeing maximum condensate flow at steam temperature.

In cold state, the valve is kept open by line pressure or gravity allowing high capacity air-venting.

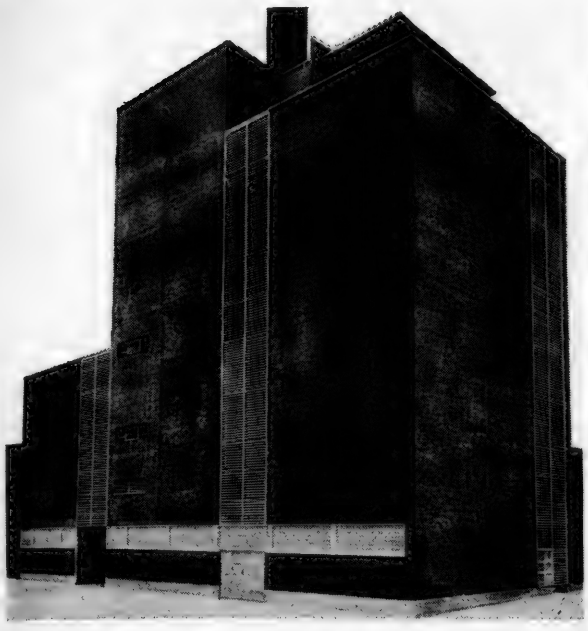
When steam enters trap body, the valve is closed tight by steam temperature acting on the bimetallic element. The adjustment of the valve can be smaller than in standard steam traps, consequently a snap action is achieved.

For cool condensate, the valve operates as in standard bimetallic steam traps. Only if steam-hot condensate enters the trap body, and the bimetallic operated valve is closed, the float is lifted by the accumulating water and pushes the valve to full open position allowing high capacity discharge of steam-hot condensate.

The valve is free-floating and can move back in the same way as in standard traps acting as a check valve to prevent back flow of condensate.

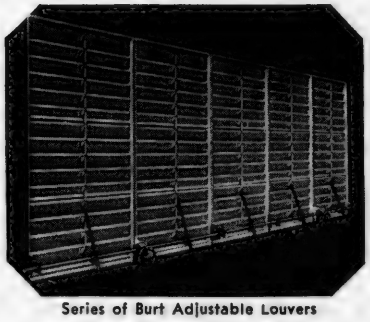
More information? Circle Item 60, postcard, back page.

(*Concluded on page* 124)



Banks of Burt Louvers in Paper Mill

BURT LOUVERS ARE VITAL VENTILATING EQUIPMENT



Series of Burt Adjustable Louvers

Air removed from a building with gravity or fan ventilators *must* be replaced. Burt Wall Louvers, with fixed or adjustable blades, provide efficient, weatherproof air inlets. The Burt line is complete, from general purpose models to industrial types and includes removable screens, louver operators and other accessories. Burt experience and specialized equipment also provide every facility to economically construct special units when required.

Send for

FREE Data Book!

Write for Burt Data Book SPV-17. It supplies quick data on Burt's complete line of modern Wall Louvers.

FAN & GRAVITY VENTILATORS
LOUVERS
SHEET METAL SPECIALTIES

The Burt Manufacturing Company
49 E. South St., Akron 11, Ohio

MEMBER POWER FAN MANUFACTURERS ASSOCIATION

KOCH

JET *forced draft*

COOLING TOWER

An amazingly efficient tower that combines the simplicity of natural draft towers with all the efficiency of a forced draft tower.

- ✳ **no moving parts!**
- ✳ **installs easily... anywhere!**
- ✳ **compact... attractive!**
- ✳ **COST LESS!**

Available sizes match all self-contained air conditioners 3 to 25 tons

Amazingly
simple design!

Simply
amazing performance

Inlet Diffuser Induetor Nozzles
Powerful Jet Action Forces Air
500 F. P. M. Velocity Assures Intimate Contact with Water Self-Cleaning Dynamic Sprays No Wood Fill 360 Glass Eliminator
Plasticlad Finish Top to Bottom

The same engineering skill that has made Koch products outstanding in the basic oil industry equipment field has gone into the manufacturing of this revolutionary new Koch Jet Action Cooling Tower

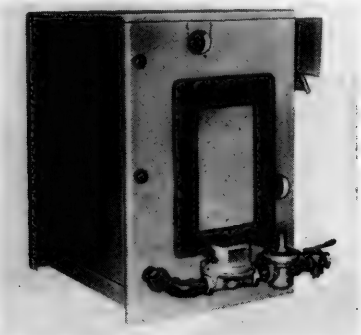
A few areas are open for Manufacturer's Representatives. Right now... write for information.

KOCH
ENGINEERING CO.
321 West Douglas
Wichita, Kansas

(*Concluded from page* 122)

Gas-Fired, Cast Iron Boiler

A gas-fired, cast iron boiler, designated Series 50, for heating large residential and commercial buildings, is announced by Peerless Heater Co., Boyertown, Pa. It introduces advances in engineering, research, modern design, and boiler setting-up procedures.



The cast iron boiler sections are preassembled and tested in blocks of 3, 4, and 5 sections which, the company states, makes setting up easy and effects savings in installation.

All company features have been included in the series including large removable end doors for easy cleanout. Burners are cast iron, with ports raised and center drilled. Burners are easily removed for inspection, and are universal for all types of gases.

More information? Circle Item 61, postcard, back page.

Gun Fastens Metal to Concrete

A piston-driven, powder-actuated fastening tool, called Stud Hammer, is available from Velocity Power Tool Co., Pittsburgh, Pa. It is not to be confused with its big brother, the power driver, also produced by the firm.

The tool can be used for attaching conduit boxes, pipe straps, door bucks, window frames, furring strips, heating ducts, partitions, panel boxes, metal and wooden signs to buildings; carpets to concrete flooring; and highway dividing markers and other wood or sheet metal articles to concrete.

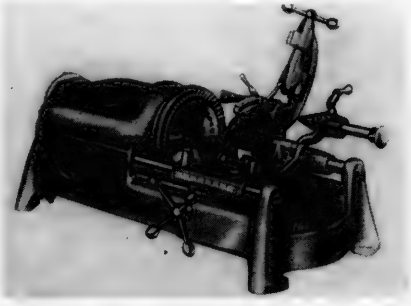
Hammer, firing a blank cartridge, can drive a specially developed nail stud through wood objects or through sheet metal, firmly anchoring the object to concrete.

Ricocheting is prevented because the nail stud is *pushed* into the work surface, rather than shot.

More information? Circle Item 62, postcard, back page.

Pipe Threading Machine

Availability of the new Ridgid 535 pipe and bolt threading machine featuring a new universal die head, is announced by The Ridge Tool Company, Elyria, Ohio. The manufacturer states that this quick-opening universal die head with its 2 sets of dies threads ½ to 2 inch pipe or conduit.



The complete 535 package also includes cutting and reaming tools including a roll-type cut off with self-centering, full-floating cutter wheel, and a five-flute cone reamer with ⅛ to 2 inch capacity. Operating independently, all tools swing up out of way when not in use.

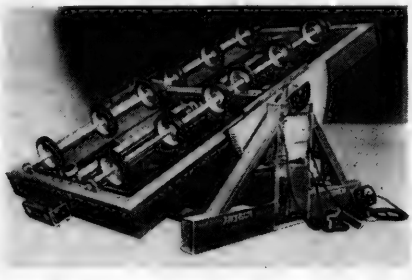
The machine also features a concealed oil system, plenty of power, lathe-type adjusting handle to move carriage, and easy-to-use length gauge. Necessary Allen wrenches, 1 tube of grease, 3 gal of Ridgoil, and an extra cutter wheel are regularly supplied.

More information? Circle Item 63, postcard, back page.

Welding Work Positioner

Industry has found that positioning the fillet weld joining the flanged head to the body of a tank effects not only a great increase in weld speed and time saving, but has greatly reduced troublesome leakers and effected further savings in reducing salvages.

The Tilting Turning Roll, manufactured by Aronson Mfg. Co., Arcade, N. Y., is universal in its application to the job. These tilting rolls can be used as plain turning rolls for work of any minimum length and up to 20 ft in length, from 4-inch dia up to 6-ft dia, and capacities up to 30,000 lb.



All models are supplied with an accurate protractor to indicate the degree of tilt, and with adjustable triggers to trip the precision limit switches at any preset degree of tilt. The vessel or tank can be tilted 45 deg either way from horizontal. The brake-motor brings the tilt to an exact, smooth stop every time.

More information? Circle Item 64, postcard, back page.

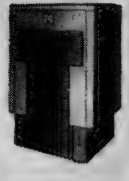
CRANE

Now! A complete line of Crane Sunnyaire Unit Heaters

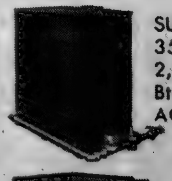
SUNNYAIRE HOT WATER AND STEAM UNIT HEATERS. 58 models provide 15,000 to 684,000 Btu/hr.
TYPE HV with wrap-around coils, vertical discharge.
TYPE HV arranged for horizontal mounting.
SUNNYAIRE GAS UNIT HEATER. 7 basic models provide 25,000 to 200,000 Btu/hr capacities.
TYPE H with continuous-tube coils.

CRANE SUNNYDAY BOILERS

—perfect companion to Sunnyaire hot water and steam unit heaters



SUNNYDAY 30
268,000 to 1,367,000 Btu/hr., gross IBR output



SUNNYDAY 40
350,000 to 2,380,000 Btu/hr., AGA input

SUNNYDAY 60
625,000 to 5,000,000 Btu/hr., AGA input

Gas, hot water and steam models, full range of sizes

Now you can fill *every* industrial and commercial unit heater specification with the *quality* heater—Crane Sunnyaire.

Sunnyaire gas unit heaters are completely automatic, completely safe, and real penny pinchers with fuel. They're designed for natural, manufactured, mixed, or LP gases, and come equipped with standard controls for these fuels. Seven basic models provide 25,000 to 200,000 Btu per hour. All models are fully approved by the American Gas Association.

If the specifications call for hot water or steam, Sunnyaire provides 58 models with capacities from 15,000 to 684,000 Btu per hour. Type H units with continuous-tube coils and Type HV units with rectangular wrap-around coils work equally well with hot water or steam.

All models are quality built, easy to install and maintain. So look into the big sales possibilities of the new Crane Sunnyaire line now! Get full details from your Crane Branch or Crane Wholesaler. In plumbing, too, ask for Crane Quality.

CRANE CO. 836 South Michigan Avenue, Chicago 5

VALVES • FITTINGS • PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

PRODUCT APPLICATIONS

New, Unusual, or Ingenious Uses of Equipment and Materials

Company Applies Own Product To Yearlong Comfort System

Early this year, American Coils Company moved its manufacturing and executive headquarters from Newark to the rural town of Farmingdale, N.J. Cost of modernizing the old 3-story building to meet production demands would have been prohibitively high even if architecturally possible. An eleven-acre site was selected as the new location, and a 63,000 sq ft, one-story plant was built.

The heating and cooling system is based on one of the firm's own products—packaged, water-to-air heat pumps. Fourteen of these units, ranging from 3 to 10 hp for a total of 123 hp, are positioned throughout the manufacturing and office areas to provide 2,000,000 Btu per hr for winter heating. Summer cooling capacity is rated at

1,470,000 Btu per hr. Water for the heat pump system is supplied from a 505-ft deep well to a 10,000 gal storage tank from which it is drawn as required by the units' water regulating valves. Each of the heat pumps is located for maximum coverage of the area it serves. Thermostatic controls mounted on each individual unit provide zone control. The only free-standing unit, 10 hp, is shown in the foreground of the illustration; one of the other 13 wall-backed units is visible in the background.

The system passed its first severe test some weeks ago when outdoor temperatures dropped to 6 deg F. The pumps, operating at only 60% capacity, kept the new building at an even 70 to 72 deg. Besides the flexibility obtainable from packaged type units, the company found a major advantage in the elimination of ductwork which would have added considerably to installation costs. Another big advantage is architectural. As no provision for ducts had to be made, it was possible to design the building entirely around its basic function—manufacturing. The result is a plant of clean, uncluttered design.

Radiator System in Swiss Church Uses Refrigerant for Heating

In the little Swiss mountain village of Fontainemelon, there is a church which has a unique heating system. An oil-fired boiler is used to heat about 105 gallons of water to approximately 192 deg F for a heat exchanger through which a refrigerant passes to and from the radiators. About 330 lb of Du Pont Freon-114 are used in the system, and the heating capacity is rated at 100,000 calories (about 400,000 Btu per hr).

Comfortable temperatures are attained in the church within 1½ hours when outdoor temperature ranges in the mid-thirties. After church services, the system is closed down simply by opening the switch to the oil burner. Then, as the temperature drops, the refrigerant flows back to the heat exchanger in its liquid form, leaving the radiators free of liquid.

The 8-ft radiators in the church are made up of ¾-inch vertical steel tubes approximately 30 inches long and welded to a horizontal 1¼-inch steel pipe, with the upper ends of the tubes closed. One continuous pipe about 90 ft long and running the length of the church assembly room carries the refrigerant vapor to each radiator and also serves to return the condensate to the heat exchanger. Radiators are placed about 3 inches from the wall and elevated 12 inches above the floor.

The water heater, heat exchanger, water lines, and vapor and condensate mains are heavily insulated with magnesia. The insulation holds enough heat in the water portion of the system to prevent freezing during shutdown periods in an area where average outdoor temperature during the winter is about 10 deg F. System was developed and installed by R. Th. Eichmann, chief engineer of the Swiss firm, Carba.

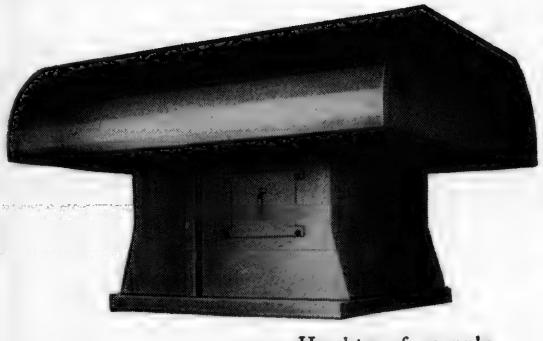
Restaurant Kitchen Has Comfort Cooling To Stop Personnel Turnover

Employee morale is an important factor in the restaurant industry where personnel turnover is an unfortunate tradition. Cooling kitchens with air exhausted from dining rooms has provided working conditions considered far from ideal.

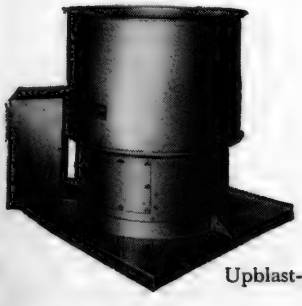
In the construction of the $1,500,000 swank Barracloughs Restaurant in Los Angeles, The Trane Co., La Crosse, Wis., installed a completely separate air conditioning system for the kitchen built around the company's Climate Changer. The system takes in outside and some return air, combining both to make up for exhausted air. Cooking fumes are vented directly to the outside. There is no fear that kitchen odors will circulate into any other areas of the restaurant.

FROM SPOT VENTILATION . . . TO LARGE-AREA SYSTEMS

. . . independent, roof-mounted units offer balanced ventilation, plant-design flexibility!



Hood-type for supply or exhaust duty



Upblast-type Exhaust Ventilator

Right in step with the trend to modern plant design, economical American Blower Power Roof Ventilators provide flexible ventilation to fit changing industrial needs. Each unit is individually operated and may be relocated, or additional units may be added, if buildings are changed or enlarged. Roof-mounted, they do not take up valuable floor space, nor does extensive ductwork interfere with overhead crane-ways. And being power operated, they may be located without regard to wind direction or temperature differentials.

Two types of American Blower exhaust and supply Power Roof Ventilators are available: hood-type and upblast-type. For full details, call your nearest American Blower Branch Office; or write: American Blower Division of American-Standard, Detroit 32, Mich. In Canada: Canadian Sirocco products, Windsor, Ont.

AMERICAN BLOWER

Division of AMERICAN-Standard

DEGREE-DAYS FOR MARCH, 1957

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

AIR CONDITIONING, HEATING AND VENTILATING'S 29th Year of Publication of Monthly Degree-Day Data

City	March			Season to March 31, incl., from Sept. 1		
	1957	1956	Normal	1956-57	1955-56	Normal
Abilene, Texas (A)	333	245	344	2218	2450	2594
Albany, New York (A)	908	1145	989	5966	6306	6045
Albuquerque, New Mexico (A)	543	483	589	3572	3547	4030
Alpena, Michigan (C)	1118	1226	1156	6529	6668	6604
Asheville, North Carolina (C)	601	550	572	3226	2804	3677
Atlanta, Georgia (A)	410	348	404	2100	2703	2673
Atlantic City, New Jersey (C)	701	768	729	3826	4218	4060
Augusta, Georgia (A)	348	319	308	1813	2481	2076
Baltimore, Maryland (C)	566	663	611	3431	3994	3804
Billings, Montana (A)	936	918	958	6087	6540	6091
Binghamton, New York (C)	883	1068	927	5395	5900	5662
Birmingham, Alabama (A)	402	354	378	2035	2681	2630
Bismarck, North Dakota (A)	1145	1281	1187	7708	8833	7839
Block Island, Rhode Island (A)	812	948	865	4575	4946	4782
Boise, Idaho (A)	700	710	719	5381	5107	5096
Boston, Massachusetts (A)	(a)	842	936	(a)	5217	4972
Buffalo, New York (A)	894	1062	992	5358	5857	5769
Burlington, Iowa (A)	841	821	822	5223	5730	5463
Burlington, Vermont (A)	1035	1273	1107	6577	6920	6739
Cairo, Illinois (C)	511	479	523	3219	3642	3527
Charleston, South Carolina (C)	276	235	260	1388	1795	1726
Charlotte, North Carolina (A)	442	430	449	2452	3003	3004
Chattanooga, Tennessee (A)	475	427	467	2602	3231	3160
Cheyenne, Wyoming (A)	976	986	1029	5738	6087	6138
Chicago, Illinois (C)[b]	846	859	845**	(a)	5178	5764**
Cincinnati, Ohio (C)	608	625	645	3633	4108	4110
Cleveland, Ohio (A)	825	891	874	4861	5293	5196
Columbia, Missouri (A)	701	647	698	4070	4692	4632
Columbia, South Carolina (A)	350	333	318	1887	2545	2207
Columbus, Ohio (C)	738	768	741	4308	4857	4694
Concord, New Hampshire (A)	942	1218	1029	6420	6593	6486
Concordia, Kansas (C)	735	717	725	4627	5245	4816
Dallas, Texas (A)	347	244	288	2088	2244	2197
Dayton, Ohio (A)	775	811	781	4635	5137	4938
Denver, Colorado (A)	795	764	843	4750	5021	5240
Des Moines, Iowa (A)	867	916	868	5520	6213	5745
Detroit, Michigan (A)	867	1003	927	5237	5614	5527
Devils Lake, North Dakota (C)	1248	1527	1314	8405	9593	8551
Dodge City, Kansas (A)	749	614	694	4375	4640	4561
Dubuque, Iowa (A)	974	1038	983	6130	6644	6349
Duluth, Minnesota (C)	1292	1360	1252	8256	8361	7929
Elkins, West Virginia (A)	762	799	797	4578	5243	4979
El Paso, Texas (A)	242	238	330	2108	2112	2531
Ely, Nevada (A)	893	901	921	6097	6152	6120
Escanaba, Michigan (C)	1161	1284	1203	6958	7029	7059
Evansville, Indiana (A)	623	619	589	3845	4281	4013
Fargo, North Dakota	1159	1406	1231	7774	8932	8082
Fort Smith, Arkansas (A)	479	407	418	2860	3251	3037
Fort Wayne, Indiana (A)	859	889	874	5201	5579	5475
Fort Worth, Texas (A)	381	260	308	2214	2294	2266
Fresno, California (A)	308	340	304	2430	2350	2344
Galveston, Texas (C)	(a)	123	176	(a)	1000	1181
Grand Junction, Colorado (A)	670	695	738	5292	4647	5226
Grand Rapids, Michigan (A)	932	1076	1008	5608	6087	6041
Green Bay, Wisconsin (A)	1078	1265	1132	6937	7267	7019
Greensboro, North Carolina (A)	547	534	528	3162	3721	3519
Greenville, South Carolina (A)	451	417	442	2510	3004	2867
Harrisburg, Pennsylvania (A)	730	824	750	4512	4855	4693
Hartford, Connecticut (A)	822	1007	871	5452	5561	5365
Hatteras, North Carolina (C)	(a)	418	394	(a)	2589	2196
Havre, Montana (C)	1006	1008	1076	7100	8094	7120
Helena, Montana (A)	1013	971	1017	7013	7454	6952
Houston, Texas (C)	118	131	166	854	1122	1249
Huron, South Dakota (A)	1045	1187	1032	6782	8149	6959
Indianapolis, Indiana (A)	742	763	772	4581	5123	4973
Jackson, Mississippi (A)	327	310	299	1764	2296	2121
Kansas City, Missouri (A)	649	613	666	4151	4593	4477
Knoxville, Tennessee (A)	496	466	500	2694	3457	3344
La Crosse, Wisconsin (A)	1000	1198	1035	6332	7212	6743
Lander, Wyoming (A)	924	997	1045	6269	6849	7027
Lewiston, Maine (O)	960	1176	1093	6417	6323	6625
Lincoln, Nebraska (C)	793	797	794	4902	5663	5277
Little Rock, Arkansas (A)	427	385	401	2567	2938	2842

(a) Data not available. [b] Grant Park weather station.

Normal figures in this table are based on a 30-year period covering 1921 to 1950, inclusive, as compiled and published by the U. S. Weather Bureau.

Figures in this table, with two exceptions, based on local weather bureau reports. Exceptions are Utica and Lewiston, figures for which are furnished through the courtesy of Coke Sales Department, Central New York Power Corp., Utica, N. Y., and Norman E. Ross, Bursar, Bates College, Lewiston, Me., respectively.

[Table concluded on page 130]

REVOLUTIONARY *new* HEATING FOR BUILDINGS

IRON FIREMAN SelecTemp®

a thermostat in every room

When every room is a separate heating zone, many of the problems that a conventional system can't touch are solved automatically . . . and with the SelecTemp heating system, they are solved economically. For example:

1. Tenant satisfaction is assured because occupants have independent control of room temperatures. They select the temperature they want.
2. Rooms are always comfortable, whether on the cold or warm side of the building, because the ever alert mechanism in each unit automatically adjusts for extra heat loss or gain, and supplies the right amount of heat needed at the right time and in the right place. Each unit takes care of its own room no matter how conditions may vary in other parts of the building.
3. Owners report substantial fuel savings because room-by-room control does away with overheating. *Heat is not wasted through open windows.*
4. The SelecTemp heating system can be economically installed in either new or existing buildings. Operating costs are low. Money can also be saved by heating only the rooms in use. The temperature can be lowered in rooms temporarily unused—then when these rooms are needed, they can be quickly reheated.

For cooling. Individual unit cooling combined with SelecTemp heating is the perfect combination for year 'round comfort, with room-by-room control of both heating and cooling.

Send for free literature. Iron Fireman will gladly send you a free booklet describing the SelecTemp heating system. Get all the facts—fill out the coupon below.

MORTON SALT COMPANY CUTS FUEL COSTS 57%

Manager of Wadsworth, Ohio office writes:

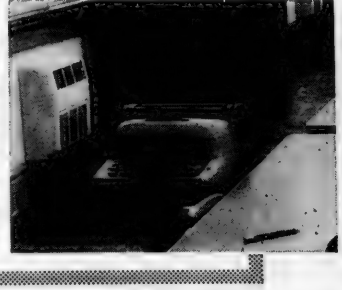
"Our former steam system was controlled by one master thermostat. We had room-heat fluctuations from 5 degrees to 25 degrees in the general office and in seven enclosed offices, resulting in absenteeism loss of 343½ working hours, because of illness due to colds. With SelecTemp heating during the season just ended we had absenteeism loss of only 75 hours.

The cost for heating in the 1954-1955 season was $1,361.13. Our cost for SelecTemp heating in the colder, longer 1955-1956 season was $586.25 or an actual saving of $774.88. However, we have had some increases, ie: Increased comfort, increased employee morale and increased attendance."

S. A. Carlson
Office Manager

Small, compact units

Only 18 inches high, the SelecTemp units are recessed in walls; take no floor space. Each unit complete with its own thermostat, air filter, heat exchangeer and steam driven fan. Steam is supplied by a low pressure boiler, fired by oil, gas or coal, or from district steam lines. Units can be painted to match walls.



IRON FIREMAN.
Engineered
HEATING AND COOLING

IRON FIREMAN MANUFACTURING CO.
3351 West 106th Street, Cleveland, Ohio.
(In Canada write to 80 Ward Street, Toronto)

- ☐ Send SelecTemp specifications and full information.
- ☐ Arrange for brief demonstration of SelecTemp room unit, in actual operation, in our office.

Name_____
Firm_____
Address_____
City_____ Zone____ State_____

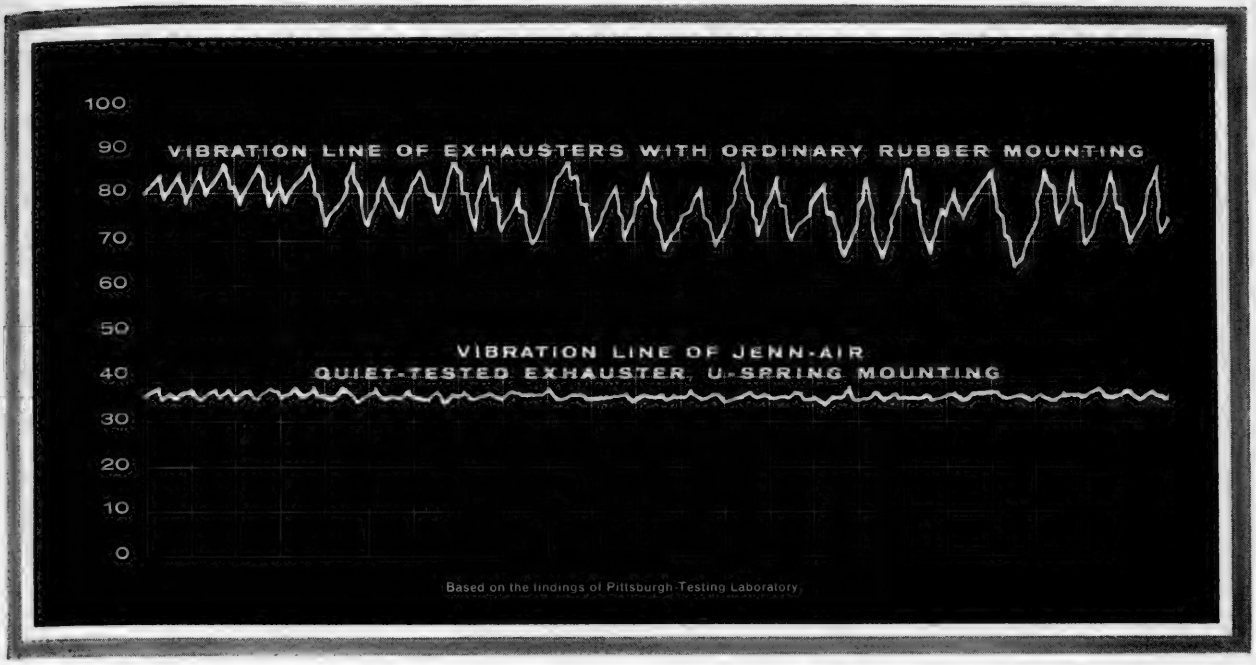
Degree-Days for March, 1957 (Concluded)

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

AIR CONDITIONING, HEATING AND VENTILATING'S 29th Year of Publication of Monthly Degree-Day Data

City	March			Season to March 31, incl., from Sept. 1		
	1957	1956	Normal	1956-57	1955-56	Normal
Los Angeles, California (C)	123	150	212	808	1246	1235
Louisville, Kentucky (A)	618	584	611	3720	4069	4055
Lynchburg, Virginia (A)	569	606	584	3501	3965	3777
Macon, Georgia (A)	300	269	275	1603	2155	1987
Madison, Wisconsin (A)	977	1064	1011	6133	6503	6342
Marquette, Michigan (C)	1192	1227	1181	6940	6899	6918
Memphis, Tennessee (A)	447	425	427	2618	3063	2974
Meridian, Mississippi (A)	329	285	309	1764	2312	2239
Milwaukee, Wisconsin (A)	1006	1036	983	6040	6147	6072
Minneapolis, Minnesota (A)	1065	1204	1057	6664	7626	6919
Moline, Illinois	861	890	862	5451	5891	5659
Montgomery, Alabama (A)	295	274	288	1593	2164	2057
Nashville, Tennessee (A)	511	479	498	2888	3465	3284
New Haven, Connecticut (A)	809	959	865	4975	5214	5128
New Orleans, Louisiana (C)	111	103	163	732	1143	1156
New York, New York (C)	712	836	753	4185	4553	4423
Newark, New Jersey	705	864	760	4333	4699	4643
Norfolk, Virginia (A)	508	527	500	2752	3297	3130
North Platte, Nebraska (A)	935	856	887	5705	6297	5738
Oakland, California (A)	346	409	360	2438	2659	2389
Oklahoma City, Oklahoma (A)	560	464	472	3397	3641	3312
Omaha, Nebraska (A)	821	841	831	5183	5934	5559
Parkersburg, West Virginia (C)	672	690	672	3979	4440	4271
Peoria, Illinois (A)	824	801	828	5071	5462	5408
Philadelphia, Pennsylvania (C)	644	795	667	3784	3246	4061
Phoenix, Arizona (A)	107	131	175	1175	1263	1430
Pittsburgh, Pennsylvania (C)	694	759	735	4163	4628	4496
Pittsfield, Massachusetts	974	1204	1060	6290	6732	6475
Pocatello, Idaho (A)	803	900	880	6120	6006	5962
Portland, Maine (A)	965	1213	1039	6395	6596	6406
Portland, Oregon (C)	524	589	515	3805	3848	3500
Providence, Rhode Island (A)	804	986	874	5076	5365	5213
Pueblo, Colorado (A)	734	747	775	4530	4935	5023
Raleigh, North Carolina (A)	499	506	440	2846	3402	2874
Rapid City, South Dakota (A)	966	953	1045	6207	6560	6359
Reading, Pennsylvania (C)	690	820	725	4303	4648	4510
Red Bluff, California (A)	340	341	336	2352	2395	2318
Reno, Nevada (A)	693	723	756	5175	5056	4946
Richmond, Virginia (A)	546	578	550	3295	3783	3618
Rochester, New York (A)	944	1118	992	5620	6103	5862
Roswell, New Mexico (A)	409	384	443	2911	3208	3211
Sacramento, California (C)	289	297	317	2267	2163	2314
St. Joseph, Missouri (A)	729	731	648	4703	5259	4294
St. Louis, Missouri (C)	633	589	620	3899	4238	4098
Salt Lake City, Utah (A)	667	694	741	5004	4942	5099
San Antonio, Texas (A)	132	140	190	1132	1435	1545
San Diego, California (A)	161	208	223	834	1270	1265
Sandusky, Ohio (C)	829	903	853	4897	5295	5088
San Francisco, California (C)	330	346	317	1930	2133	1996
Sault Ste. Marie, Michigan (A)	1232	1381	1302	7580	7605	7671
Savannah, Georgia (A)	255	253	238	1401	1903	1667
Scranton, Pennsylvania (A)	886	1033	859	5483	5825	5282
Seattle, Washington (C)	561	669	558	3848	4126	3595
Sheridan, Wyoming (A)	932	1027	1035	6360	6894	6642
Shreveport, Louisiana (A)	308	267	272	1806	2078	2056
Sioux City, Iowa (A)	901	967	930	5802	6666	6231
Spokane, Washington (A)	841	890	834	6138	6294	5770
Springfield, Illinois (A)	761	730	713	4708	5159	4734
Springfield, Missouri (A)	655	606	632	3905	4358	4256
Syracuse, New York (A)	920	1123	955	5600	6130	5637
Toledo, Ohio (A)	868	961	905	5301	5838	5522
Topeka, Kansas (C)	677	632	669	4317	4795	4499
Trenton, New Jersey (C)	713	832	735	4267	4639	4495
Utica, New York (O)	1136	1141	989**	6452	6337	5955**
Valentine, Nebraska (A)	1018	980	970	6223	6909	6140
Walla Walla, Washington (C)	623	612	564	4794	4889	4301
Washington, D. C. (C)	584	655	606	3572	3964	3864
Wichita, Kansas (A)	646	602	619	4118	4460	4183
Williston, North Dakota (C)	1098	1194	1194	7635	8582	7836
Winnemucca, Nevada (A)	760	813	794	5606	5430	5396
Yakima, Washington (A)	722	753	660	5717	6068	5172

For footnotes, see page 128.



The above chart shows a comparison of vibration levels between ordinary exhausters and Jenn-Air Quiet-Tested Exhausters.

44% Less Vibration with JENN-AIR Quiet-tested Roof Exhausters!

Independent Laboratory Tests Prove Conclusively That Jenn-Air Quiet-Tested Roof Exhausters With U-Spring Suspension Show 44% Better Vibration Isolation Than Exhausters With Power Assembly Mounted in Rubber

Noise elimination is a problem which faces the ventilation industry today. To minimize the noise caused by vibration, Jenn-Air developed the Quiet-Tested Roof Exhauster with U-Spring cushion suspension. Now an independent laboratory offers proof positive this new principle of suspending the power assembly with U-Springs does the job. The PITTSBURGH TESTING LABORATORY, an independent research firm, was recently asked to compare Jenn-Air's Quiet-Tested Roof Exhauster, with U-Spring Suspension Mounting, against exhausters with ordinary rubber isolators. Tests were conducted under actual working conditions. Result: (see chart for dramatic evidence): *Jenn-Air Exhausters showed 44% less vibration transmission than the other exhausters.*

Jenn-Air Quiet-Tested Roof Exhauster, with U-Spring Cushion Suspension Mounting. Note low contour design which complements modern architectural lines.

U-SPRING CUSHION SUSPENSION MOUNTING REDUCES VIBRATION . . . NOISE LEVEL

This innovation is another important improvement by Jenn-Air. It ensures against the major operating vibration and noise being transmitted through the duct work and into the building. The stainless steel also assures you the permanency of this quiet operation. Jenn-Air—and only Jenn-Air—Quiet-Tested Exhausters are proved under simulated field conditions. Each unit must pass rigid inspection by the critical *Vibronic Eye* . . . is 'screened' in Jenn-Air's Sound-Elec Test Chamber to detect noise and vibration.

Patents Pending

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Gentlemen:
Please send me free catalog giving complete information on how Jenn-Air U-Spring Cushion Suspension Mounting cuts vibration, lowers noise level.

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NEWS OF THE MONTH

SPECIFICATIONS WORKSHOP

discourages "or equal" term in private work and contractor's over-all guarantee of systems.

More than 60 representatives of professional, technical, trade, and manufacturing groups tackled the industry-wide problem of writing specifications to improve quality and workmanship in buildings. The specifications workshop was conducted on February 27 and 28 by Building Research Institute, Washington, D. C.

Working as two groups, one on architectural, the other on electrical-mechanical specifications, the workshop made these recommendations:

• **SCOPE OF THE WORK**— The electrical-mechanical group agreed that the designer should make every effort to ascertain the specific requirements for work ordinarily provided by a given specialty contractor, and that this work should be included under the scope of work for the particular trade involved.

• **CONTROL OF QUALITY FOR MATERIALS AND EQUIPMENT**—The electrical-mechanical group emphasized the use of "performance requirements only" for specifications of material and equipment. The architectural group felt that these requirements were generally more applicable to mechanical equipment than to architectural materials, except for items where properties of acceptable materials vary greatly, for example insulation.

Both groups concurred in a recommendation that the term "or equal" in using trade names to specify products should be discouraged for private work. They agreed on a special paragraph as follows:

VARIATION FROM MATERIALS SPECIFIED—Materials or products specified by name of manufacturer, brand, trade name, or catalog reference shall be the basis of the bid and furnished under the contract unless changed by mutual agreement. Where two or more materials are named, the choice of these shall be optional with the contractor. Should the contractor wish to use any materials or products other than those specified, he shall so state, naming the proposed substitutions and indicating what difference if any will be made in the contract price for such substitution, should it be accepted.

The workshop also agreed that reference to a single name or product in private work should be discouraged as tending to eliminate competition, and that detailed descriptive requirements for materials should be used with discretion or only as a last resort.

Both groups favored using standards where possible to control quality, but cautioned some standards may need close scrutiny, perhaps modification, in order to uphold quality and encourage competition. They urged the construction industry make known its requirements to interested associations and manufacturers and wanted a more active campaign by the American Society of Testing Materials and the American Standards Association aimed at educating architects and engineers on ASTM and ASA work.

• **GUARANTEES**— The workshop thought that guarantees of more than a year should be worded to clearly define what constitutes a failure and what is expected for a correction. The electrical-mechanical group said that performance guarantees for over-all design should not be required from contractors for systems engineered by designers, but only guarantees of individual components when operating at design conditions with other system components.

The workshop vetoed lump-sum allowances in lieu of specified items, with the architectural group excepting items like cost ornamentation, sculpture, special lighting fixtures, and builders' hardware, etc. The consensus was that it was more desirable to specify builders' hardware in detail.

The architectural group said specifications should include sufficient description to indicate to the contractor the extent of the labor required to install specified items, and that all allowances be listed under "special conditions" or in a separate section with cross references to the individual trade sections involved.

• **PERSONNEL**—Specifications Workshop was chairmaned by David S. Miller, vice-president, The Kawneer Company. Architectural group moderator was Max Barth, Department of Defense, and the technical secretaries were Ben H. Dyer, Bethesda, Md., specifications consultant, and John L. Haynes, managing director of The Producers' Council, Inc.

Electrical-mechanical group moderator was E. R. Cornish, research director, National Electrical Contractors Association.

(*News of the Month continued on page* 134)

Architects' Display Building, Mountainside, N. J., provides 27,000 sq ft of exhibition space for permanent displays of products for residential, commercial, and institutional building. No direct sales efforts are made. Guides are employees of Built-in Age, Inc., owner. Architects, engineers, salesmen may bring clients. There is no admission charge. Viewer signs register, giving home address and field of interest, is taken to appropriate exhibits, given literature on these products. Manufacturers involved are notified.

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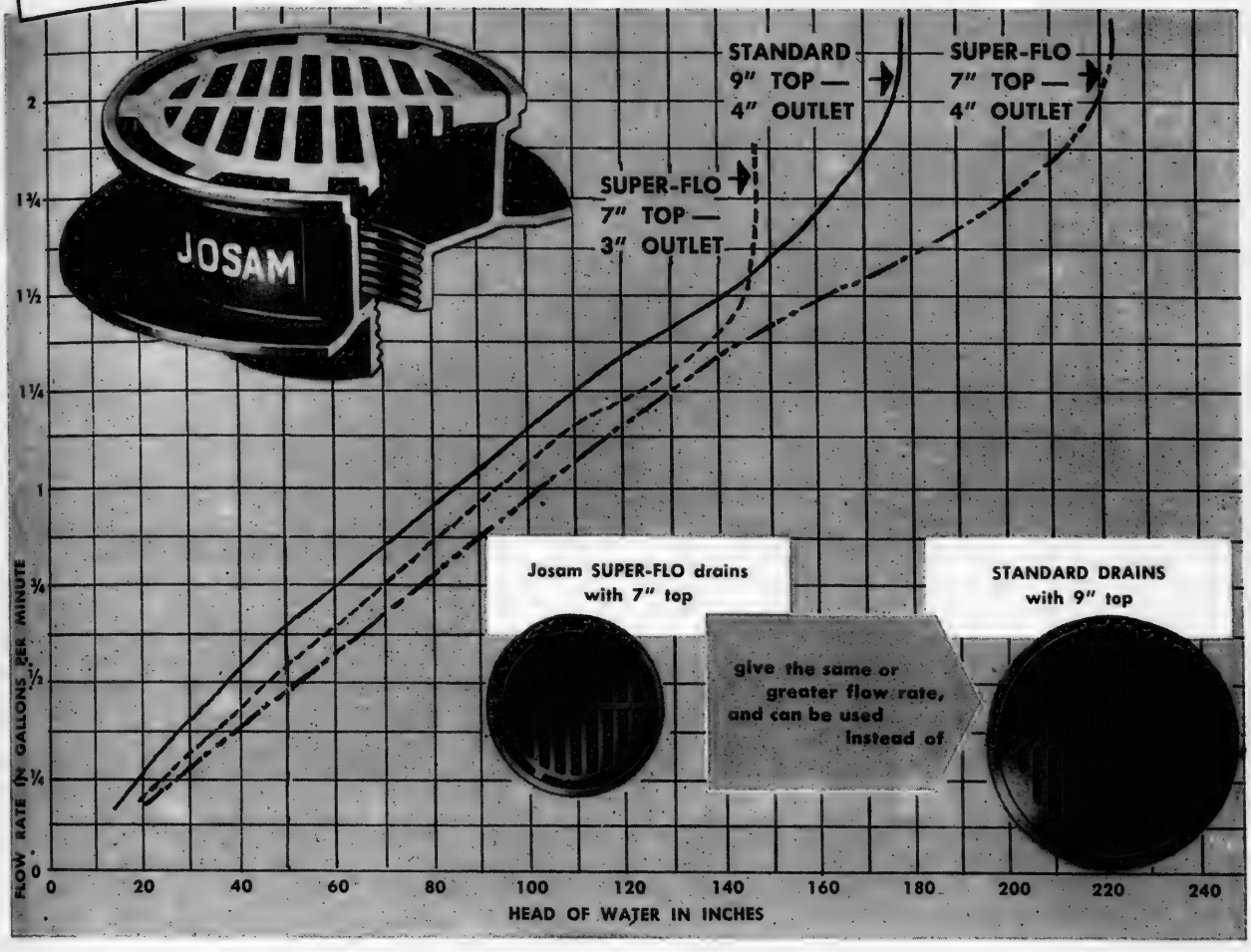
JOSAM
STANDARD 9" TOP — 4" OUTLET
SUPER-FLO 7" TOP — 4" OUTLET
SUPER-FLO 7" TOP — 3" OUTLET
Josam SUPER-FLO drains with 7" top
give the same or greater flow rate, and can be used instead of
STANDARD DRAINS with 9" top
FLOW RATE IN GALLONS PER MINUTE
0 ¼ ½ ¾ 1 1¼ 1½ 1¾ 2
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JOSAM "SUPER-FLO" is the only drain with additional slots around the perimeter of the grate which permit a greater flow rate (GPM) into this drain than in standard type floor drains of the same size or even larger. Water flows away faster since it drains at the outside edges of Super-Flo drains instead of only flowing into the center portion of ordinary drains. Thus, a "SUPER-FLO" drain of a smaller top size can be used to service the same drainage condition as a larger type standard drain. There is no need to employ drains with large tops when JOSAM "SUPER-FLO" drains with smaller tops and very often smaller outlet sizes can be utilized to do a more efficient job at *less cost*. Other extra features offered in "SUPER-FLO" drains are greater sanitation and wider adaptability in installation which unquestionably make them the *very best* floor drains on the market today. In floor drains, you use the best when you use JOSAM "SUPER-FLO".

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NUCLEAR CONGRESS

held in Philadelphia draws record attendance to meetings

More than 8000 engineers, businessmen and scientists attended the 1957 Nuclear Congress held at Philadelphia's Convention Hall March 10-15, thereby exceeding the record set in 1955. The week-long session, coordinated by Engineers Joint Council and sponsored by 25 leading engineering and scientific societies, was devoted to peaceful uses of atomic energy. The program dealt with such topics as reactor design, disposal of radioactive wastes and use of isotopes in industry.

More than 200 technical papers and panel sessions were presented during the Congress and approximately 150 exhibitors took part in the concurrent International Atomic Exposition. Highlights of the week included major speeches by Dr. Kenneth W. Davis and Admiral Paul F. Foster, in charge, respectively, of reactor development and international activities for the AEC.

AIR-CONDITION SCHOOLS

to permit year-round use, ARI urges. Governors' conference will discuss summer classes for economy.

Air conditioning of the Nation's schoolrooms to permit efficient full-time utilization of the multi-billion dollar plant now in being was recommended for discussion at the National conference of Governors, to be held in Williamsburg, Va., June 23-26.

Prompted by reports quoting Virginia's Governor Thomas B. Stanley, chairman of the Governors' Conference, that year-round utilization of school facilities would be one of the major topics before the June 23-26 conference, Geo. S. Jones, Jr., managing director of the ARI, wrote to Governor Stanley suggesting that ". . . Perhaps the air-conditioning industry could be represented at the conference to explain how its facilities could help the States to meet their ever-increasing school problem."

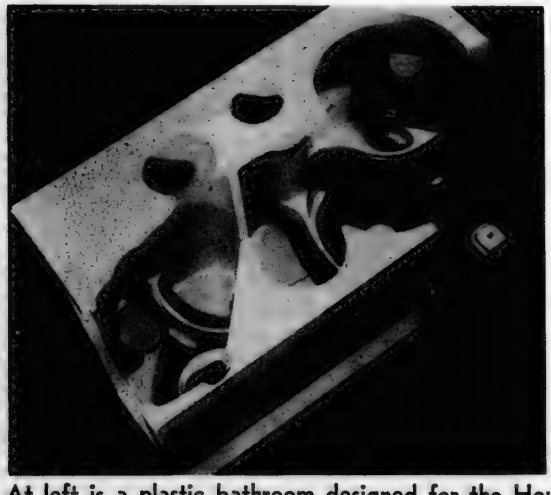
• **DATA TENDERED**—Mr. Jones assured that the industry-wide organization would be happy to participate in any way, adding "I am sure that we can provide statistical data that would be of value in the consideration of this problem. . . . "

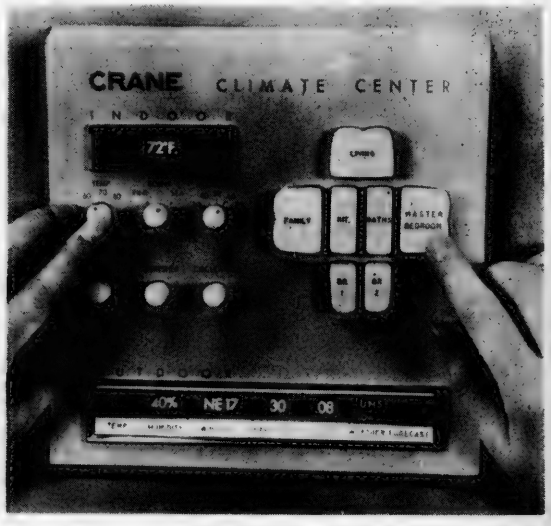
Gov. Stanley had said earlier that the way he envisioned the plan, school terms would be staggered so the buildings would be in use throughout the year. This would not mean, it was explained, that a child would attend all year round, but that each student would have classes about three fourths of the year. In making the announcement, it was noted that no state has escaped the problem of classroom space, and that, the Virginia chief executive was quoted, other States are "in as dire need as we here in Virginia."

Other governors have indicated that the year-round utilization proposal is worthy of most thoughtful consideration because of increased costs of providing needed classrooms.

• **TIMES HAVE CHANGED**—In his letter Mr. Jones pointed out that "certainly our States, cities and counties can ease the load on the taxpayer by full-time utilization of

(*Concluded on page* 136)





At left is a plastic bathroom designed for the House of the Future, Disneyland, Calif., by Crane Co., Chicago, Ill. At left in plaster model is children's bathroom with water closet and shower fixtures molded as part of the wall. Lavatory will be adjustable vertically in 7-inch range to make it convenient for children as well as adults. Full-size bath at right has electronic control panel for lavatory under mirror for automatic control of temperature, supply, and waste.

At right is a Climate Center for installation in the kitchen. Complete information on, and control of temperature, humidity, and scent for each room is included. Outside weather is recorded on bottom of panel.

Plastics Div., Monsanto Chemical Co., Springfield, Mass., is sponsoring the exhibit, to be constructed this month, as a demonstration and test structure to establish plastics as an engineering and decorative material of construction.

Rollingwood Estates, a new hillside development in San Bruno, Calif. *Plumbing and Heating Contractor:* W. L. Hickey Sons, Inc., San Bruno. *Jobber:* Grinnell Company of the Pacific. San Francisco.

Suburban Homes in California...Apartment Building in Maryland

Both Have Beth-Co-Weld Piping

Shown here are the Carrollton Apartments, a new 100-family structure in Baltimore, Md., and Rollingwood Estates, a 1600-unit suburban development in San Bruno, Calif., south of San Francisco. Each has hundreds of feet of Beth-Co-Weld steel pipe for plumbing and heating lines.

Carrollton Apartments, Baltimore, Md. *Plumbing and Heating Contractor:* Heer Bros., Inc., Baltimore. *Jobber:* Hajoca Corporation, Baltimore branch.

Beth-Co-Weld steel pipe is popular for plumbing and heating work because it's good, sound pipe, made from quality steel by the continuous-weld process. Contractors also like the economy Beth-Co-Weld makes possible, as it's such easy pipe to cut, thread and weld.

You'll find Beth-Co-Weld meets all your requirements for steel pipe. It comes in diameters from ½ in. to 4 in. in standard weight. In extra-strong weight it is furnished in diameters from ½ in. to 3 in. Both weights come in 21-ft lengths, plus or minus 1 in., and in random lengths. When buying pipe, ask for Beth-Co-Weld.

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Slot
STRIPLINE DIFFUSERS by AGIAIR®
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STRIPLINE combines the best features of both slots and efficient air diffusers to provide equalized air flow throughout its entire length.
STRIPLINE slot diffusers are slenderly designed, inconspicuous, practical and versatile. These slot diffusers can be located in walls, ceilings, coves, moulds, window reveals and stools or almost anywhere to suit interior design.
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the facilities for which he has been and is being taxed. Our nation is facing a completely changed state of affairs —the initial reason, as I understand it, for the summer 'vacation' from school was the belief the pupils . . . do not absorb knowledge when uncomfortably hot; also the fact that, many years ago, boys and girls were needed during the summer for help on the farm or the family business."

Canadian Degree-Days for March, 1957*

City	March		Cumulative	
	1957	Normal**	1956-57	Normal
Calgary, Alta.	1137	1200	7963	7740
Charlottetown, P.E.I.	1158	1220	6975	6900
Crescent Valley, B. C.	967	940	6992	6600
Edmonton, Alta.	1283	1290	8453	8660
Fort William, Ont.	1331	1380	8831	8750
Grande Prairie, Alta.	1415	1380	9133	9100
Halifax, N. S.	1001	1042	5807	5997
London, Ont.	991	1040	6116	6250
Medicine Hat, Alta.	1068	1130	6544	7510
Moncton, N. B.	1144	1190	7307	7190
Montreal, P. Q.	1096	1180	7072	7240
North Bay, Ont.	1225	1350	7479	8210
Ottawa, Ont.	1087	1220	7254	7520
Penticton, B. C.	823	780	6109	5520
Prince George, B. C.	1098	1110	8659	7760
Quebec City, P. Q.	1178	1300	6842	7960
Regina, Sask.	1402	1420	9241	9190
St. John, N. B.	1078	1160	7003	7040
Saskatoon, Sask.	1377	1440	9329	9390
Timmins, Ont.	1385	1530	9105	9400
Toronto, Ont.	915	1018	5606	5936
Vancouver, B. C.	666	680	4840	4430
Victoria, B. C.	666	620	4619	4050
Windsor, Ont.	924	950	5503	5710
Winnipeg, Man.	1382	1441	9190	9178

* These data are supplied through the courtesy of the Meteorological Division Air Service Branch, Department of Transport, Canada.
** New normal figures covering 30-year period, 1921 to 1950.
The Department reports a slight revision in the figures for February, as published in last month's issue. Corrected figures are: Calgary, Alta., 1403; Fort William, Ont., 1541; Montreal, P. Q., 1232; Ottawa, Ont., 1250; Regina, Sask., 1616; St. John, N. B., 1192; Vancouver, B. C., 820; Victoria, B. C., 746.

Cell Block Heating

(*Continued from page* 79)

since the infiltration and cold-surface draft from these large glass areas is very noticeable.

A major complaint was the fact that hot air and objectionable odors collected at the top of the uppermost cells. An exhaust fan and ductwork are installed to collect the return air through intake grilles. Part of this return air is discharged from the building by the exhaust fan and the remainder is mixed with the fresh air and circulated in the building.

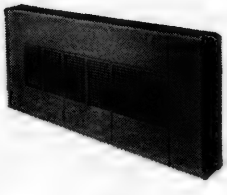
The new heating units are supplied with steam at 5 psi gage pressure; room thermostats control a modulating steam valve at each heating unit for temperature control. In addition, a thermostatic control will shut down the air heating units in the event the discharge air temperature falls below 65 deg F. A manual control switch at each heating unit enables the unit to be shut down for service.

Since this heating system has been placed in service, a much more uniform temperature is recorded throughout

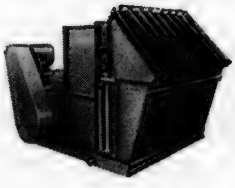
(*Concluded on page* 138)

TONRAC® — single-stage hermetic centrifugal refrigerating machine — maintains chilled-water temperature *regardless of load*. Single-level construction simplifies installation.

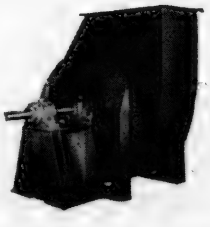
You'll get one-source responsibility from American Blower's complete air-conditioning line



Compact and easily accessible, American Blower Inductor Units are available for both high- and low-pressure systems.



American Blower line includes Multi-Zone Conditioners, plus central-station units and self-contained packaged air conditioners.



Sirocco® High-Pressure Fans are part of the complete American Blower package for high-velocity, high-pressure air-handling systems.

American Blower offers a complete line of air-conditioning products which are designed, engineered, and manufactured to work together. Whether it's for a small installation or a large-scale central or zone system, you can specify *all* your equipment from a single source — pinpoint responsibility for quality, performance, delivery dates. You'll save time and money doing it — and you're assured of a balanced system!

Point is, for every air-conditioning and air-handling requirement, there's an efficient, dependable product backed by American Blower's 75 years' experience. From self-contained packaged units and heating and cooling coils to Tonrac Centrifugal Refrigerating Machines, you get the finest when you specify American Blower. Why not get in touch with our nearest branch today! American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

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FOR RESIDENCES, Quickdraft makes low, cold and erratic chimneys function. On and off with the fire, Quickdraft maintains constant draft required for efficient and economical combustion of all fuels. It eliminates pulsating or chattering, puffing, smoking and sooting.

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Individual _____ Title _____
Street _____
City _____ Zone ___ State _____

(*Concluded from page* 136)

the cell blocks, and odors have been reduced to an acceptable level. Complaints are no longer received regarding the heating and ventilating system.

Credits

The improvements described were under the direction of the late Nathan L. Smith, director of the Department of Public Improvements of the State of Maryland. The Department of Correction of the State of Maryland is directed by Harold E. Donnell, superintendent of Prisons. The Warden of the House of Correction is William F. Steiner. The analysis of the old heating system and the designs for the new heating system were prepared by Whitman, Requardt and Associates, consulting engineers, Baltimore. The heating work was performed by two contractors—that in the West Cell Wing by Heer Brothers, Baltimore, and that in the South Cell Wing by Stehle, Beans and Bean, Annapolis.

WHAT READERS SAY

Seasonal Boiler Efficiency

EDITOR, AIR CONDITIONING, HEATING AND VENTILATING

I was interested in your article, The Meaning of Boiler Efficiency, appearing in your March, 1957 issue. The statement is made, "Unfortunately, however, data on seasonal efficiencies for heating plants in the size range from 30 to 500 nominal boiler horsepower is practically non-existent."

Perhaps our experience in Portland will be helpful. To determine the seasonal boiler efficiency, reference was made to Pacific Power & Light Company's steam heat customers in Portland. The quantity of steam purchased by each customer is, of course, metered for billing purposes. For some of these, records are available on their fuel oil consumptions before being converted to central steam heat. This offers the opportunity of relating annual steam consumption to annual barrels of fuel oil, and under identical conditions of piping and radiation. All factors relating to seasonal boiler efficiency are thus encompassed.

The average figure proved to be 3,565 lb of steam per barrel of fuel oil.

If we assume that the heat that may be recovered from the steam, through the building radiation and economizers is 1,050 Btu per lb and that each barrel of oil has a heating value of 6,400,000 Btu, then we arrive at the following equation: Seasonal boiler efficiency equals $(3565 \times 1050)/6{,}400{,}000$ equals 58.6%. This figure for seasonal efficiency may seem rather low when compared to the test efficiency.

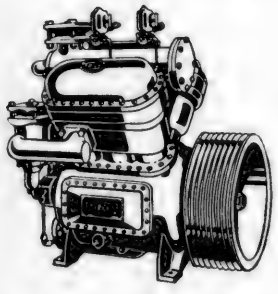
Any study of fuel requirements, however, must consider the boiler efficiency under usual operating conditions. Boiler efficiency must reflect the influence of field maintenance, false starts, under runs, over runs, and all the various loadings experienced in actual operation.

R. E. Sinclair
Rate Engineer

Pacific Power & Light Co.
Portland, Ore.

TRADE FRICK MARK®

Air Conditioning Serves Throughout this Unique Hotel



Nine Frick "ECLIPSE" Compressors Air-Condition the Claypool Hotel at Indianapolis

Famed as the first COMPLETELY air-conditioned large hotel north of the Mason-Dixon Line, the Claypool at Indianapolis selected Frick equipment because it had used Frick Refrigeration for food service since 1939.

Nine Frick "ECLIPSE" compressors, installed by Decker and Roberts of Fort Worth, carry the air conditioning load, which is divided into three systems.

You get the utmost in air conditioning, ice making, quick freezing and cooling services when you specify "Frick." Let us quote now on your commercial or industrial cooling needs.

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One trade rapidly installs this *one* completely integrated ceiling which includes all radiant ductwork, aluminum acoustical panels, diffuser panels and framing for recessed fixtures. *One* medium, air, is responsible for heating, cooling, ventilation and humidity control.

The result is a system which combines the speed of response and installation economy of forced air systems with the superior comfort of radiant heating and cooling—at prices which have competed successfully with quality conventional forced air systems of heating and air conditioning.

(Above) Some 30,000 sq. ft. of SIMPLEX radiant-acoustical ceiling help keep patients in the new Beckley Memorial Hospital, Beckley, W. Va., comfortable. Archt: Isadore Rosenfield, Engr: John D. Dillon, both of N. Y.

(Right) Attractive anodized aluminum ceiling surface is free of conventional air diffusers and dirt rings. Station Master's Office in Grand Central Station, N. Y.

Send today for AIA booklet containing photographs, details and specifications.

SIMPLEX CEILING CORP.

552 W. 52 St., New York 19, New York

Please send me folder 39b describing your radiant-acoustical ceiling.

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Firm .....

Address .....

City ..... Zone ..... State .....

COMING EVENTS

Where listed, names or titles of individuals are those from whom further information is available

PROFESSIONAL ENGINEERS—Annual convention and exposition New York State Society of Professional Engineers, Statler Hotel, New York, N. Y. Harold Becker, NYSSPE, 1941 Grand Central Terminal Bldg., New York, N. Y. ..... **MAY 16-18, 1957.**

ASRE CONVENTION—44th annual meeting of the American Society of Refrigerating Engineers, at Hotel Fountainebleau, Miami, Fla. Secretary of the Society, 234 Fifth Ave., New York 1, N. Y. ..... **JUNE 2-5, 1957.**

NDHA MEETING—48th annual meeting of the National District Heating Association, at The Homestead, Hot Springs, Va. J. F. Collins, Jr., secretary-treasurer of the Association, 827 N. Euclid Ave., Pittsburgh, Pa. ..... **JUNE 3-6, 1957.**

OHI CONVENTION—35th OHI annual convention, held in conjunction with the Biennial Eastern Exposition of Oil Heat and Domestic Cooling, at the Sheraton-Plaza Hotel, Boston, Mass. Secretary, Oil-Heat Institute of America, Inc., 500 Fifth Ave., New York 36, N. Y. ..... **JUNE 3-7, 1957.**

WARM AIR HEATING—National Warm Air Heating and Air Conditioning Association summer convention, Hotel Fairmount, San Francisco, Calif. ..... **JUNE 5-7, 1957.**

TECHNICAL CAREER CONFERENCE—A Technical Career Conference, sponsored by the Technical Career Council, at the Sherman Hotel, Chicago, Ill. M. W. Hinson, director of the Council, 19 S. LaSalle St., Chicago 3, Ill. ..... **JUNE 8-12, 1957.**

PLANT MAINTENANCE SHOW—3rd Western Plant Maintenance & Engineering Show and Conference, in the Civic Auditorium, San Francisco, Calif. Clapp & Poliak, Inc., 759 Monadnock Bldg., San Francisco, Calif. ..... **JUNE 11-13, 1957.**

ASHAE SUMMER MEETING — Semi-annual meeting, American Society of Heating and Air-Conditioning Engineers, Manoir Richelieu, Murray Bay, Quebec, Canada. A. V. Hutchinson, executive secretary of the Society, 62 Worth St., New York 13, N. Y. ..... **JUNE 24-26, 1957.**

AGA MEETING—Annual convention, American Gas Association, Kiel Auditorium, St. Louis, Mo. AGA, 420 Lexington Ave., New York, N. Y. ..... **OCTOBER 7-9, 1957.**

ASRE MEETING—Semi-annual meeting of the American Society of Refrigerating Engineers, at the Hotel Shoreland, Chicago, Ill. Secretary of the Society, 234 Fifth Ave., New York 1, N. Y. ..... **NOVEMBER 14-16, 1957.**

WHOLESALERS—Annual meeting, Air Conditioning and Refrigeration Wholesalers, Sheraton Hotel, Chicago, Ill. Secretary, 2607 N. High St., Columbus, Ohio. ..... **NOVEMBER 16-18, 1957.**

AIR-CONDITIONING AND REFRIGERATION EXPOSITION — 10th exposition of the Air-Conditioning and Refrigeration industry, sponsored by the Air-Conditioning and Refrigeration Institute, at Chicago's International Amphitheatre, Chicago, Ill. Secretary of the Institute, 1346 Connecticut Ave., N. W., Washington 6, D. C. ..... **NOVEMBER 18-21, 1957.**

WARM AIR HEATING—Annual convention, National Warm Air Heating and Air Conditioning Association, Hotel Morrison, Chicago, Ill. George Boedener, Secretary, NWAHACA, 640 Engineers Bldg., Cleveland, Ohio ..... **NOVEMBER 18-22, 1957.**

ASHAE WINTER MEETING — 64th annual meeting, American Society of Heating and Air-Conditioning Engineers, Pittsburgh, Pa. A. V. Hutchinson, secretary ASHAE, 62 Worth St., New York, N. Y. ..... **JANUARY 27-29, 1958.**

JOINT ASHAE-ASRE MEETING—Joint summer meeting, American Society Heating and Air-Conditioning Engineers and American Society Refrigerating Engineers, Hotel Leamington, Minneapolis, Minn. ..... **JUNE 23-25, 1958.**

EXPOSITION AND ASHAE CONVENTION—65th annual meeting, American Society Heating and Air-Conditioning Engineers (Jan. 26-29, 1958) and 14th International Heating and Air Conditioning Exposition, Philadelphia, Pa. ..... **JANUARY 26-30, 1959.**

BISON

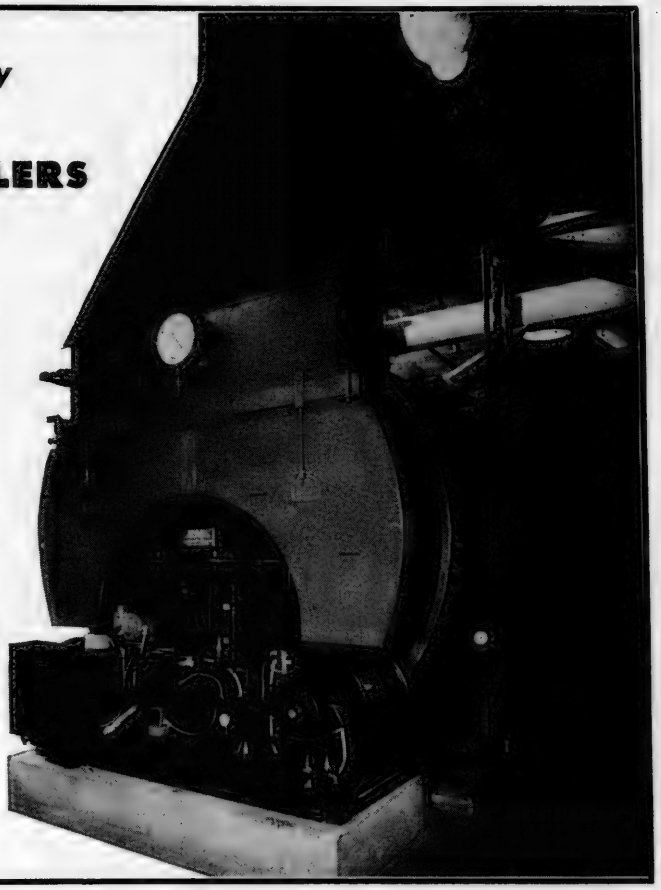
Dependable quality since 1863 . . . . .

POWER BOILERS

Throughout 93 years, Farrar & Trefts has been a leader in boiler design and construction. Today, as in yesteryear, F & T offers dependable, efficient, modern power boilers to satisfy the ever-increasing demands of institutional, apartment, office and industrial buildings. Under the same BISON brand, F & T also furnishes low-pressure boilers for heating purposes.

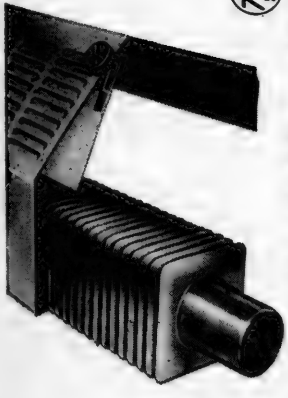
Proper selection of a boiler for the continuous delivery of required heat and power is a precise project, demanding the systematic approach of engineers long trained in this work. Engineers at F & T have this background of service and they welcome opportunities to evaluate the needs of boiler users.

Standard F & T Super Scot Power Boiler (150 lb. design pressure) with "Indiana Pack" burner at Mastic Asphalt Corp., South Bend, Ind. Furnished by Page Associates of Chicago. The Austin Co. were the Engineers and Contractors.



FARRAR & TREFTS DIVISION
YUBA MANUFACTURING COMPANY
20 MILBURN ST. BUFFALO 12, N. Y.

SARCO*fin* GIVES YOU ALL THESE ADVANTAGES!



I-B-R **APPROVED RATINGS** for finned-tube and baseboard radiation.

1-YEAR GUARANTEE by Sarco and Sarcotherm.

COOPERATION—careful selection of radiation by experienced Sarco and Sarcotherm heating engineers.

COMPLETE LINE—get from one source...SARCO ...finned-tube and baseboard radiation, heating specialties, pumps, temperature regulators, Sarcotherm weather-compensated control systems.

Write for Bulletins.

2126-P

SARCO COMPANY, INC.
EMPIRE STATE BUILDING, NEW YORK 1, N. Y.

RIGIDBILT
PRODUCT COOLERS

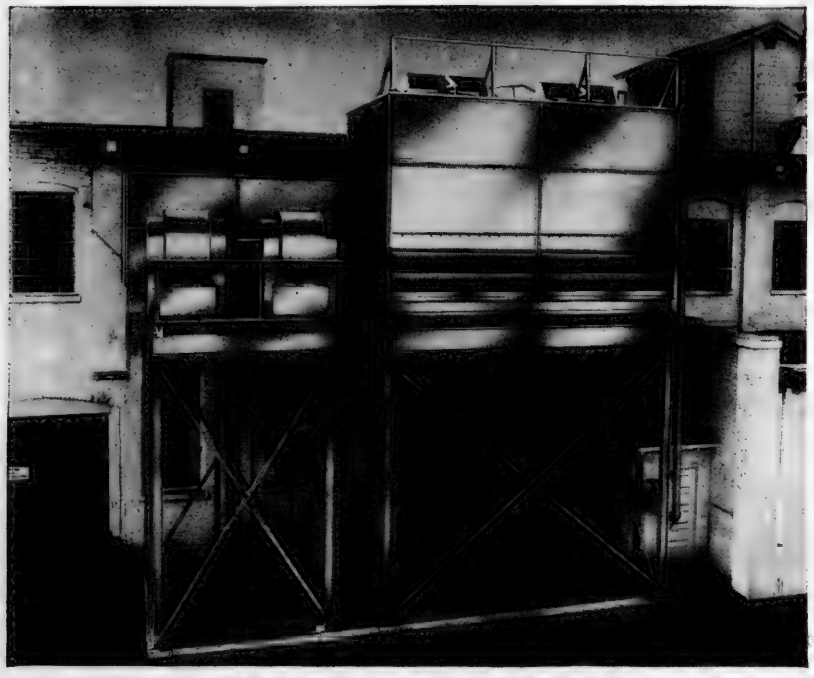
Units available for any given temperature need, for both wet and dry operation. Water, and hot gas defrost can be furnished. Special problems needing custom engineered units are our specialty.

FLOOR UNIT—(FLOODED AMMONIA)
Water Defrost
Others for all refrigerants and applications.

RIGIDBILT IS BETTER BUILT
Write for Catalog

RIGIDBILT INC.
2852 W. FULTON BLVD.
CHICAGO 12, ILL.

HEATING REFRIGERATION • AIR CONDITIONING



Binks cooling towers—a youngster and an old-timer—work side by side at Vick Chemical Company, Greensboro, N. C. Tower at left was installed 17 years after tower at right which still serves faithfully.

Vick Chemical Company...

Supplements 1936 installation with second Binks cooling tower

17 years after their first Binks cooling tower installation, Vick Chemical needed additional cooling capacity. The dependable performance of their existing Type "K" mechanical draft tower was a decisive factor in selecting a second Binks cooling tower installation.

New Binks Series 3-B tower cross-connected with first tower

The new Binks Series 3-B cooling tower is used for condensing process steam. The old tower is presently used for the air conditioning system. Each installation is independent of the other but cross-connected so that each may stand by for the other in cases of emergency or during periods of maintenance.

Built-in long life

Case histories proving the dependable performance of Binks cooling towers are not uncommon. All parts are built to rigid specifications which insure long life. And, Binks cooling towers are designed for easy periodic maintenance, a factor appreciated by those who must do the work.

For full information

on Binks complete line of mechanical and natural draft cooling towers, write directly to the address below. Binks engineers will gladly study your needs and help you select the correct tower for your requirements.

659

Binks
EVERYTHING FOR WATER COOLING

A COMPLETE LINE OF NATURAL DRAFT AND MECHANICAL DRAFT COOLING TOWERS AND INDUSTRIAL SPRAY NOZZLES

Binks Manufacturing Company
3120-38 Carroll Ave., Chicago 12, Ill.

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

NEW CATALOGS

Use the prepaid postcard on back page for securing your copies of catalogs described in this department.

PACKAGED LIQUID CHILLERS — A 2-color, 16-page, illustrated catalog, Form AC-233, contains specification data on Series SW sealed, water-cooled, packaged liquid chillers, 3 to 30 tons manufactured by Airtemp Div., Chrysler Corp., Dayton, Ohio. Warranty information; chiller, condenser, and compressor construction; control panel features; and electrical capacity and water-pressure-drop data are included.

Circle **Item 65** on Inquiry Card

HEATERS AND DEVICES—A 16-page power requirements section, showing short and long form calculations for heating applications, is included in the 1957 catalog of heaters and heating devices published by General Electric Co., Schenectady, N. Y. The 72-page Bulletin GEC-1005H includes information on such new products as redesigned cartridge heaters, miniature soldering irons, aluminized steel sheath strip heaters, and new ratings and configurations of finned tubular heaters. In the power requirements section, each heating process is described. Typical application problems are solved to give heating requirements in both a long and a short form method.

Circle **Item 66** on Inquiry Card

UNIVERSAL PUMPS—For those interested in modern large scale hot water heating and chilled water cooling systems 4-page engineering Bulletin HQ-856 is offered by Bell & Gossett, Morton Grove, Ill. Bulletin lists important base mounted universal pump features and gives a typical specification form. A large cutaway diagram plus detailed capacity and size information are included.

Circle **Item 67** on Inquiry Card

ELECTRONIC AIR CLEANER DATA — Seventeen factors to consider in the proper application of electronic air cleaners are detailed in Form EAC Bulletin No. 1 published by Air Filter Institute, Washington, D. C. A short discussion on servicing is included.

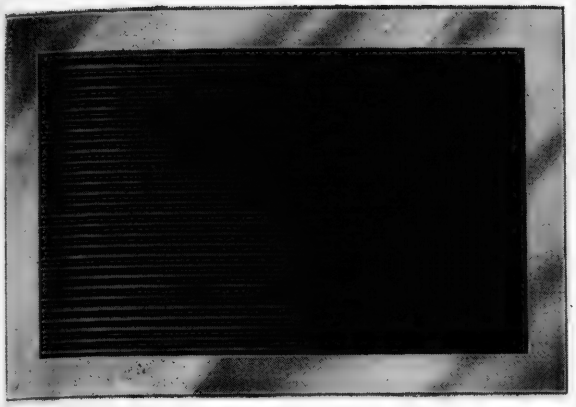
Circle **Item 68** on Inquiry Card

EVAPORATIVE ROOF COOLING—What its roof cooling system is and how it works is explained in a brochure published by Fanjet Roof Cooling Div., Muellermist Irrigation Co., Maywood, Ill. Included in the discussion is automatic control of the system, its water consumption, and maintenance.

Circle **Item 69** on Inquiry Card

(*Continued on page* 144)

ALL NEW! ALL ALUMINUM! ALL EXCLUSIVE!



New A-J All-Aluminum No-Vision Grille

Another first in the field for A-J! This new extruded all-aluminum no-vision grille is the first of its kind . . . a grille that offers exclusive quality features never before available!

Imagine the beauty of this all-aluminum construction. Picture how its striking, modern look blends so perfectly with contemporary interior designs. Think of the ease of upkeep—corrosion and rust can never detract from its lifetime beauty. Because of the lightweight characteristics of aluminum, this new A-J Grille provides maximum free area (approximately 70%) with minimum weight.

The entire unit reflects quality in every detail of its construction. The extruded V-bars (of .044 aluminum) are spaced three to the inch, making the grille completely sightproof. The "B" frame (.050 aluminum) has perfectly mitered corners which are securely fastened and locked mechanically—there's no surface blemish to mar its attractive appearance. Rims have countersunk screw holes for fastening to door or partition. Fastening screws are furnished with each unit. By utilizing an auxiliary frame (also of extruded aluminum) the grille span can be adjusted from 1¼" to 2⅛" in depth.

CHOICE OF FINISHES

Standard mill finish is provided unless otherwise specified. Anodized or polished finishes are available. If non-standard finishes are desired, please consult the factory for prices.

NOTE: The new A-J Aluminum Grille is also available with an "A" style channel frame of .050 sheet aluminum. If ordered in this manner, installer provides molding or stops.

This new A-J Grille is produced in standard sizes. For more information write A-J Manufacturing Company, Dept. V-5, 3601 E. 18th St., Kansas City 27, Mo.

FREE CATALOG

listing, describing and pricing 1,000 types and sizes of grilles, registers, etc.

A-J Manufacturing Co.

Dept. V-5 3601 E. 18th St., Kansas City 27, Mo.

SAVE TIME and MONEY

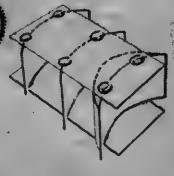
when you form FLEXIBLE CONNECTORS

ELGEN SILENT DUCT

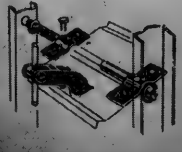
U. S. Pat. No. 2,777,573

Imagine, this one-piece, factory-assembled metal-to-material unit unrolls absolutely *flat!* No more bothering with unwieldy duct material that buckles easily. Elgen Silent Duct makes on-the-spot work a cinch . . . you just measure and cut. You can fabricate *any type* of flexible duct connector in minutes . . . with half the effort! You can save up to 60%! No more worry about an inventory of "made-up" parts, either. Your choice of U.L. approved, (Gov't. Spec. Mil-D-10860) canvas, *Johns-Manville* asbestos and *U. S. Rubber* neoprene coated fibre glass, in 3" or 6" widths attached to 24 or 26 gauge galvanized steel or 24 gauge aluminum to fill every job requirement. All available in handy-to-use 25, 50 or 100 foot rolls.

2 More Elgen Products That Put Profits In Your Pocket!



ELGEN ALL-TITE VANE RUNNER
• Quickest and easiest way ever devised for installing turning vanes for square elbows • No special tools required; vanes lock easily with blow of hammer



ELGEN DAMPERSET
For Multi-Blade Dampers . . . Parallel or Opposed • Most perfect damper hardware developed • Assembles in a jiffy . . . cuts assembly time in half • Easily adjusted and self-aligning. Licensed by Minneapolis-Honeywell

ELGEN PRODUCTS ARE SOLD THROUGH LEADING JOBBERS EVERYWHERE.

"Put Profits In Your Pocket!"

Write today for free catalog and "spec" sheet!

ELGEN MANUFACTURING CORP. 41-34 39 Street Long Island City, N. Y.

THE DUAL PURPOSE PUMP

1 SUMMER The TVC Pump disposes of the condensate resulting from the moisture removed from the air by the air conditioner.

2 WINTER The TVC Pump returns the steam condensate to the heating plant.

Figure 320 illustrates simple piping hookup with a unit used for air conditioning in the summer and heating in the winter. This type of unit is efficient, economical and easy to maintain.

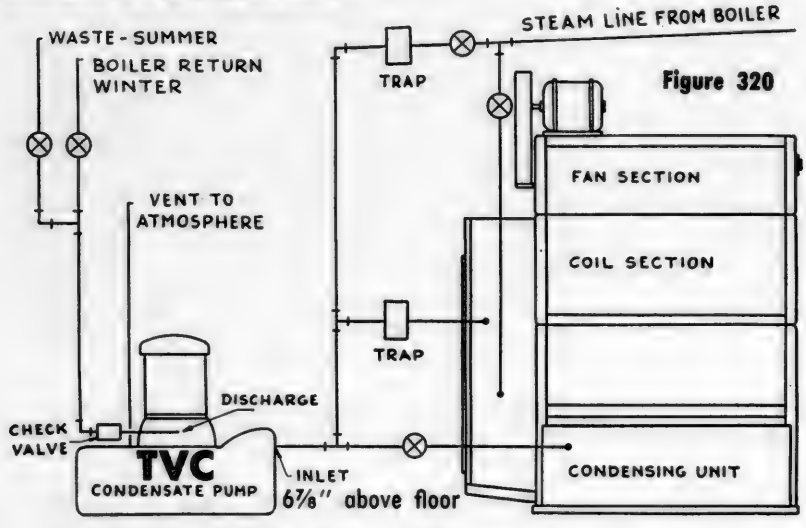


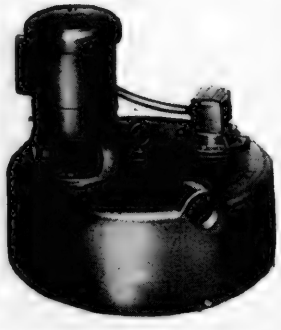
Figure 320

The weil TVC PUMP is the answer

VERY LOW RETURN CONNECTION – 6⅞"
Makes pump adaptable to any installation

LOW SPEED (1750 RPM)
Assures long motor life

CAST IRON RECEIVER – 21" DIA.
Does not rust out – last for a lifetime



CAPACITIES
500 to 10,000 sq. ft. E.D.R.
10 to 30 lbs. P.S.I.

ECONOMICAL
Bronze casing and impeller, stainless steel shaft and brass strainer guarantee years of trouble-free service

FACTORY ASSEMBLED
Ready for immediate installation

AVAILABLE FROM JOBBERS' STOCKS

Send for Bulletin TVC-300

weil PUMP COMPANY
1516 No. Fremont St., Chicago 22

weil Dependable PUMPS

NEW CATALOGS

(*Continued from page* 142)

Use the prepaid postcard on back page for securing your copies of catalogs described in this department.

WATER HEATING EQUIPMENT — Five bulletins covering its line of hot water storage tanks, heaters, and converters are available from Richmond Engineering Co., Richmond, Va.

Bulletin 500-A is a 4-page brochure dealing with the entire line in general and listing Reco representatives throughout the United States.

Circle **Item 70** on Inquiry Card

Bulletin 514 covers company's line of copper silicon hot water storage tanks and heaters. It includes construction details and suggested specifications.

Circle **Item 71** on Inquiry Card

Bulletin 504 deals with convertors. Six pages of tables permits rapid selection, based on illustrative example given.

Circle **Item 72** on Inquiry Card

Bulletin 512 contains 16 pages of capacity data, design conversion factors, and dimensions for hot water storage heaters.

Circle **Item 73** on Inquiry Card

Bulletin 513 on copper-lined hot water storage tanks and heaters gives specifications and construction details for horizontal and vertical models.

Circle **Item 74** on Inquiry Card

ELECTRONIC CONTROL CENTERS — A new concept in automatic temperature control, developed by Barber-Colman Co., Rockford, Ill., is illustrated and described in an 8-page booklet, F 8031. It discusses the functions, uses and advantages of centralized automatic control with visual supervision of the entire heating and air conditioning system. Schematic illustration, remote control point adjustment, remote temperature indication, and remote temperature recording, are illustrated and described in detail.

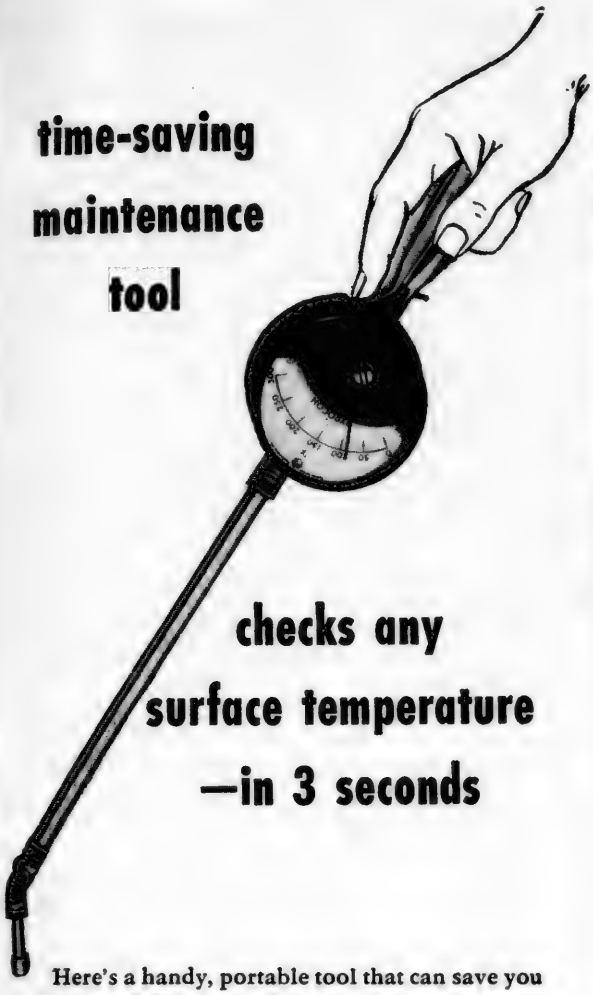
Circle **Item 75** on Inquiry Card

ADJUSTABLE-PITCH FANS — Revised Bulletin A-111B, covering its line of adjustable-pitch cooling tower and heat exchanger fans, is published by Hartzell Propeller Fan Co., Piqua, Ohio. The catalog contains descriptions, specifications and performance data on fans with aluminum-alloy blades in diameters from 40 to 132 inches and models with plastic blades in diameter from 10 to 22 ft. It also includes detailed data on company's controllable-pitch heat exchanger fan.

Circle **Item 76** on Inquiry Card

(*Continued on page* 146)

time-saving maintenance tool



checks any surface temperature —in 3 seconds

Here's a handy, portable tool that can save you hours of time in checking surface temperatures of steam traps, water lines, electric motors, bearings, etc.

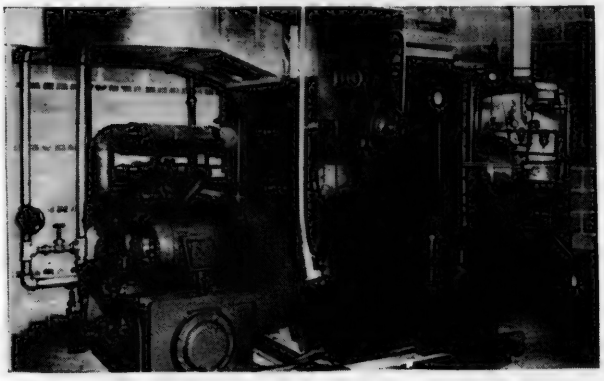
The Alnor Pyrocon gives instant, accurate temperature readings of any surface: metallic or non-metallic, flat, curved—even revolving surfaces. It's a well-balanced instrument mounted in a sturdy case for protection against the usual hazards of on-the-job service. Jeweled movement is also heavy-duty, shock-resistant type that will withstand hard and continuous use...performing with laboratory accuracy.

A wide selection of thermocouples and extension arms assures its adaptation to your needs. Eight standard F. scale ranges are available up to 2000° F. Send for complete details contained in Bulletin 4257. Illinois Testing Laboratories, Inc., Room 514, 420 N. LaSalle St., Chicago 10, Ill.

PRECISION INSTRUMENTS FOR EVERY INDUSTRY

Alnor®

DRY AIR... PRECISELY as you want it



NIAGARA CONTROLLED HUMIDITY AIR CONDITIONING

This method removes moisture from air by contact with a liquid in a small spray chamber. The liquid spray contact temperature and the absorbent concentration, factors that are easily and positively controlled, determine exactly the amount of moisture remaining in the leaving air. Heating or cooling is done as a separate function.

The Niagara's Controlled Humidity Method using HYGROL moisture-absorbent liquid is

Best and most effective because . . . it removes moisture as a separate function from cooling or heating and so gives a precise result constantly and always. Niagara machines using liquid contact means of drying air have given over 20 years of service.

Most reliable because . . . the absorbent is continuously reconcentrated automatically. No moisture-sensitive instruments are required to control your conditions.

Most flexible because . . . you can obtain any condition at will and hold it as long as you wish in either continuous production, testing or storage.

Easiest to take care of because . . . the apparatus is simple, parts are accessible, controls are trustworthy.

Most compact, taking less space for installation.

Inexpensive to operate because . . . no re-heat is needed to obtain the relative humidity you wish in normal temperature ranges and frequently no refrigeration is used to remove moisture.

The cleanest because . . . no solids, salts or solutions of solids are used and there are no corrosive or reactive substances.

Write for full information; ask for Bulletins 112 and 121. Address Dept. HV-5.

NIAGARA BLOWER COMPANY
405 Lexington Ave., New York 17, N. Y.
District Engineers in Principal Cities of U.S. and Canada

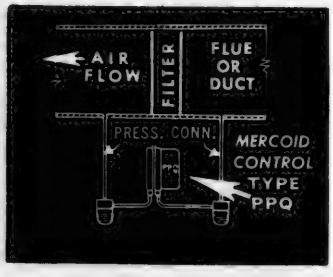
EXTREMELY
"Sensitive"
DIFFERENTIAL PRESSURE
Control
BY
MERCOID®

Has Hermetically Sealed
Magnetic Mercury Switch

FOR AIR OR GAS
(INCHES OR FRACTION OF INCHES OF WATER)

For low pressure or vacuum—to "make" or "break" electrical circuits on small changes in the difference between two pressures. Examples: to indicate a change in resistance through a filter (see illustration); to indicate a change in differential due to a change in air flow conditions; to indicate interruption of air flow.

This control incorporates two pressure chambers separated by a sensitive diaphragm. Each chamber is connected to a separate pressure source and the control is set to operate as the relationship of the two pressures change.



OPERATING RANGES—6" vacuum to 6" pressure (sensitivity .03") and 30" vacuum to 30" pressure (sensitivity .1" to .2").

CIRCUIT ARRANGEMENTS—several models available to accomplish the following operations:

SPST—USING ONE MAGNETIC SWITCH—open or close switch contact either on an increase or decrease at pressure difference.

SPST—USING TWO MAGNETIC SWITCHES FOR TWO STAGE OPERATION. Open/close both switch contacts on an increase in pressure difference.

Open one contact on increasing pressure difference and one on decreasing pressure difference.

Close one contact on increasing pressure difference and one on decreasing pressure difference.

CASE STYLES—three types to meet following conditions: Indoor (general purpose), Outdoor (weather resistant), and Hazardous locations (explosion-proof).

WRITE FOR BULLETIN No. 14N

THE MERCOID CORPORATION
4211 Belmont Ave., Chicago 41, Ill.

NEW CATALOGS

(*Continued from page* 144)

Use the prepaid postcard on back page for securing your copies of catalogs described in this department.

COPPER-LINED WATER HEATERS — Data on its copper-lined storage water heaters are collected in Data File 16 issued by The Patterson-Kelley Co., Inc., East Stroudsburg, Pa. Designed to be used as a file folder, it contains all that is needed to specify and select copper-lined storage water heaters for any industrial or commercial installation. Contents include: diagram of construction details and recommended minimum specifications; 8-page tabular section of dimensions, heating capacities and engineering data; installation suggestions and piping arrangements; and advertised case histories of typical installations.

Circle **Item 77** on Inquiry Card

EXPANSION JOINTS—Bulletin EJ-1915, published by Yarnall-Waring Co., Philadelphia, Pa., describes Type W Gun-Pakt expansion joint which features an improved one-piece design of body and gland which eliminates the customary bolted joint between body and gland. The 8-page bulletin also gives data on how to figure expansion of pipe lines and suggestions for installation of expansion joints.

Circle **Item 78** on Inquiry Card

PIPE CLAMPS, SPRINGS, BRACKETS—The products set forth in Catalog 200 published by Elcen Metal Products Co., Franklin Park, Ill., include pipe clamps, hangers, rollers, supports, saddles, springs, and brackets. A separate section of the 75-page publication deals with the company's line of copper tubing hangers, clamps, and fittings.

Circle **Item 79** on Inquiry Card

CENTRIFUGAL PUMPS—Type A close coupled, single stage, enclosed impeller centrifugal pumps are described in a brochure available from Scot Pump Co., Thiensville, Wis. Continuous duty units for air-conditioning, refrigeration, cooling tower, and booster applications are illustrated with specifications and performance curves.

Circle **Item 80** on Inquiry Card

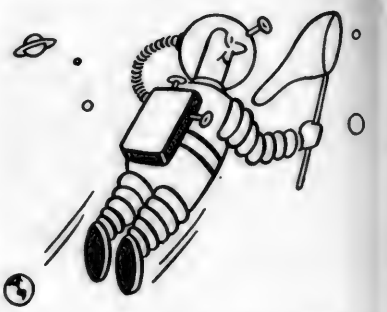
NATURAL GAS AIR CONDITIONERS—Commercial or industrial air conditioners that operate with natural gas engine-compressor units and typical applications of them are contained in Bulletin 284-2 available from The Ready-Power Co., Detroit, Mich. Operating costs are outlined. Entire packaged refrigerant systems with integrated controls are also shown.

Circle **Item 81** on Inquiry Card

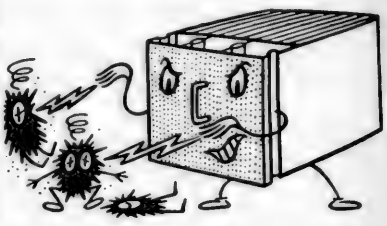
(*Continued on page* 148)

AIR-MAZING FACTS

BY O. SOGLOW



CLEAN AIR IS OUT OF THIS WORLD! To find atmosphere completely free from earth-formed dirt, you'd have to travel 60 miles—straight up! But there's an easy, down-to-earth way of getting super-clean air.



ELECTROCUTES DUST! For industrial or commercial applications the Electromaze electronic air filter uses an electrical charge to remove the finest dusts, pollens—even smoke particles. Widely used in ventilating offices, hospitals, and stores. Can be serviced automatically. New G-E selenium rectifier eliminates tube maintenance.

SHORT-STOPS GREASE DROPS! Greastop filters grab air-borne grease, dirt and dust from the air—reduce fire hazards in kitchen exhaust ducts. It's one of hundreds of filter types designed by Air-Maze—*the filter engineers.*

FOR AIR CONDITIONING AND VENTILATING EQUIPMENT, ENGINES, COMPRESSORS *or any device using air or liquids*—there is an Air-Maze filter engineered to solve each filtering problem. For new all-line catalog, write Air-Maze Corporation, Dept. D-1, Cleveland 28, O.

AIR-MAZE
The Filter Engineers

AIR FILTERS • SPARK ARRESTORS • LIQUID FILTERS
SILENCERS • OIL SEPARATORS • GREASE FILTERS

Aerovent builds 'em BIG!

"WE BUILD THE FANS TO FIT YOUR PLANS!"

Yes . . . in duct fans, as in all types of air-moving equipment, Aerovent offers a size for every standard industrial application (and special sizes to order).

Illustration above shows a huge 84" duct fan . . . one of 24 built by Aerovent for installation in substations of The Consolidated Edison Company in New York City. These mighty fans, with 20 H.P. motors turning 580 RPM, move air against resistance at the rate of 100,000 CFM. Other Aerovent units are available from 12" to 96"; capacities to 145,000 CFM.

Aerovent Duct Fans . . . direct-driven for standard applications or belt-driven for conditions requiring motor outside airstream . . . may be ordered with special duty motors, alloy propellers and special protective coatings for extreme temperature, moisture or corrosive conditions.

WRITE FOR FREE BULLETIN No. 151

DUCT FANS FOR ALL INDUSTRIAL REQUIREMENTS

Direct-Driven Duct For installations which permit connection of entire fan assembly in air-stream. For vertical or horizontal use. 12" to 96".

Belt-Driven Duct Used for corrosive or high-temperature conditions, which require motor to be outside airstream. 2, 4, 6 or 7 blades. 12" to 96".

"Bi-Flo" Duct For pressures in the 1½" to 4½" range. New 7-blade "Machete" Airfoil Propellers move more air with lower horsepower. 18" to 48".

"EFFICIENCY-ENGINEERED" equipment for every air-handling problem!

Rated in accordance with Standard Test Code and U.S.D.C. Comm. Std. CS178-51.

Certified Ratings

Aerovent FAN CO. INC.

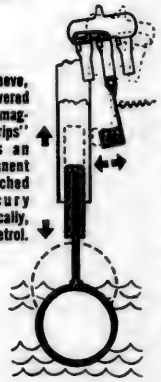
Ash and Brandt Sts. Piqua, Ohio

Safer because it's Simpler

■ Of all boiler water level controls, we believe Magnetrol to be the safest. Certainly it is the simplest.

A PERMANENT Alnico magnet, located *outside* the float chamber, links boiler water level and electrical controls. This infallible magnetic link eliminates mechanical parts normally subject to wear and fatigue failure. *Pioneered and perfected by Magnetrol,* it provides almost unlimited operating life.

The brass "No-Scale" float chamber liner, another exclusive Magnetrol feature, is self-cleaning. It actually "flexes" off scale and prevents "sticking" of the float.



A magnetic sleeve, raised and lowered within a non-magnetic tube, "trips" or releases an Alnico permanent magnet attached to a mercury switch. Basically, this is Magnetrol.

These are just two of *many* advances for greater boiler safety found *only* in Magnetrol. *Standard* Magnetrol units are available for temperatures up to 750°F., at pressures up to 600 psi, for single stage (low water cut-off) or multi-level stage (pump control *plus* low water cutoff and alarm) service with as many as three separate switching actions. Special units are available for more extreme requirements.

MAGNETROL, Inc.

Mail the Coupon Now for the Facts

MAGNETROL, INC., 2106 S. Marshall Blvd., Chicago 23, Ill.

Gentlemen: Please send me Catalog Section III and full information on Magnetrol Boiler Water Level Controls. 9

Name_____

Company_____

Address_____

City_____ Zone____ State_____

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CONTROL

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FLEXAUST®

HOSE

Made of strong neoprene coated cotton or nylon fabrics spiral wire reinforced.
For *all* kinds of fume and dust control, and ventilation uses.
Extremely flexible, durable, and lightweight.
Exceptionally easy to cut, install, connect, reuse, and relocate.
Sizes 1¼" thru 36" i.d.

Write for details today
Distributors
in all principal cities

THE FLEXAUST COMPANY
Dept. HV-5
100 PARK AVE. NEW YORK 17, N. Y.

NEW CATALOGS

(*Continued from page* 146)

Use the prepaid postcard on back page for securing your copies of catalogs described in this department.

COOLING TOWERS—Construction, water distribution, fans, motor, housing, and drive of its Type WB, standard, and Type KB, Take-Apart, centrifugal fan cooling towers are covered in Bulletin CF-600, published by Halstead & Mitchell, Pittsburgh, Pa. Take-apart units may be dismantled for installation in difficult places. Tables are devoted to sump capacities, operating and dimensional data, and space requirements with weights per section.

Circle **Item 82** on Inquiry Card

CONTROL VALVES—Two specifications, S810-11 and S810-12, published by Valve Div., Minneapolis-Honeywell Regulator Co., Philadelphia, Pa., give details of construction on single-seated and double-seated Series 800 diaphragm control valves. Included are sizes, materials, plug characteristic curves, dimensions, and a cross-section drawing of each type. Applicability of these pneumatically-operated valves throughout industry for controlling the flow of liquids, gases, and steam under a wide range of operating conditions is discussed.

Circle **Item 83** on Inquiry Card

FLEXIBLE AIR DUCT—A 4 page circular, Form 591, that describes in detail the various types of flexible air duct used for air conditioning, fume and dust exhaust, and corrosive fumes, is available from The Wiremold Co., Hartford, Conn. In-service photographs illustrate product versatility, and qualified sales engineers representing the Air Duct Division of the company are listed.

Circle **Item 84** on Inquiry Card

ANION EXCHANGER SUBFILL — The role that demineralizer subfill plays in reducing costs of the operation of a demineralizing system is discussed in Technical Reprint T-153 of a paper presented at the American Power Conference this year. It is available from Graver Water Conditioning Co., New York, N. Y.

Circle **Item 85** on Inquiry Card

HORIZONTAL UNIT HEATERS—Catalog 2557 gives performance data, complete wiring and piping diagrams, construction features, and architects' specifications on the line of horizontal unit heaters manufactured by Young Radiator Co., Racine, Wis. Information on proper mounting heights and air throw is furnished, and included are descriptive diagrams on all phases of construction and installation of these heaters.

Circle **Item 86** on Inquiry Card

ALLOYS AND FLUXES—A data folder for office use issued by All-State Welding Alloys Co., Inc., White Plains, N. Y., condenses into ready reference form data needed by buyers of specialty alloys and fluxes. Covering its line of alloys and fluxes, there is wanted information in the data folder for all concerned with jointing, tinning, or cutting which involves steel, aluminum and aluminum alloys, cast iron, copper and copper-bearing alloys, magnesium, nickel, monel, stainless steel, and zinc die cast.

Circle **Item 87** on Inquiry Card

WHAT IS AMCA?—A 12-page, illustrated booklet, "Activities and Purposes of the Air Moving and Conditioning Association," published by the 59-company trade association in Detroit, Mich., shows how it was formed and how it functions to benefit industry and the public by its activities. Also covered are origins of the Association, names of member companies, organizational structure, standing committees, officers and directors.

Circle **Item 88** on Inquiry Card

REFRIGERATION SPECIALTIES—Its line of refrigeration specialties is covered in a product catalog available from Metrex Valve Co., Franklin Park, Ill. Included are: screw, flanged and union-end modulating high capacity condensing water regulators with manual by-pass for flushing, sealed dehydrators charged with silica gel or bead activated alumina, a water-cooled booster condenser package to supplement the standard air-cooled condenser, sealed tubular strainers, and refillable dehydrators. Dimensional and price data are given.

Circle **Item 89** on Inquiry Card

AIR SOURCE HEAT PUMP— A twelve-page illustrated brochure describing the York compound-compression air-source heat pump for commercial and industrial use has been published by the York Corp., York, Pa., a subsidiary of Borg-Warner. Contains system diagrams, cost analysis charts, and performance charts showing heat output and power consumption comparisons between conventional single stage heat pump systems and the multi-stage system as well as illustrations of components used in the system.

Circle **Item 90** on Inquiry Card

OUTDOOR CONTROLS—How to automatically control building temperatures from the outdoors is told in a 4-page, illustrated brochure, No. P-257, offered by Automatic Devices Co., Inc., Western Springs, Ill. Company's Weather-Man and Weather-Chron regulators and time switches which operate on this principle and which can be used with all fuels, in all classes of buildings, and with all types of heating systems, are described. Included is a simple chart which recommends the type of weather control to be used under varying conditions.

Circle **Item 91** on Inquiry Card

(*Continued on page* 150)

KENCO PUMPS

for EVERY application

Coolant applications, liquid transfer, sumps, septic tanks, water supply, air conditioning, transformer vaults, fire fighting, dewatering ditches — *name your pumping requirements, there's a Kenco Pump to match your needs!*

NEW MODEL 109

Submersible Pump — portable pump or permanent installation. Redesigned — more compact and lighter — still has all the famous 109 features! Pumps up to 3300 GPH. Pump-motor-switch enclosed in water-tight, corrosion-resistant case. Ideal for operation in sumps, boiler room pits, septic tanks, etc.

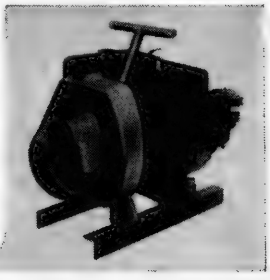
NEW MODEL 110

Submersible Pump — greatest capacity submersible utility pump ever offered. Newly designed — more compact and lighter — still has all the famous 110 features! Pumps up to 5000 GPH. Designed for automatic sump pump duty in large buildings and for continuous submerged duty such as circulating coolants, liquid transfer.

MODEL 140

Submersible Pump — 2600 GPH pump designed for completely automatic intermittent operation in cellars, transformer vaults, and for continuous duty applications. A lightweight, low-cost, portable, easily installed pump.

MODEL 114



Portable Centrifugal Pump — portable gasoline engine powered centrifugal pump with a capacity of up to 6000 GPH, and pumps at heads up to 100 feet. Self priming. Weight, 55 lb. 2¼ HP engine.

Get all the facts on the complete line of Kenco Pumps from your Kenco jobber, or write us.

KENCO PUMP DIVISION

A DIVISION OF THE AMERICAN CRUCIBLE PRODUCTS CO.

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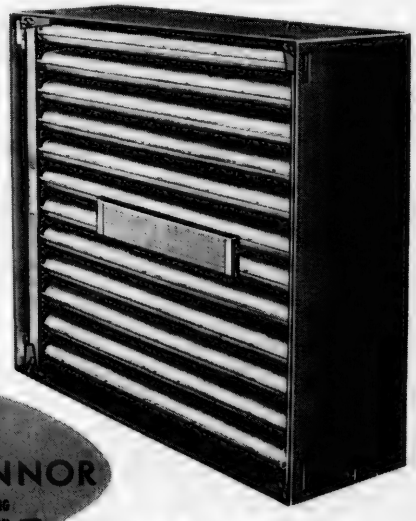
FOUL AIR FOULING YOUR OPERATION?

It was at Metalphoto Corporation, Cleveland, Ohio. The company makes photosensitive aluminum plates for direct printing of name plates, dials, scales and similar products. From time to time, batches of these plates became chemically fogged, primarily by sulfide gases from nearby industrial plants.

Metalphoto searched for a remedy — and found it in Dorex Air Recovery. In the area where the plates are light sensitized, Dorex activated carbon filters were installed. Ventilating air was admitted only through them. The results? Here's the report from Metalphoto's Vice President R. A. Kempe:

"It's been almost a year since Dorex went in, and not a single plate has been spoiled due to gaseous impurities. We estimate the cost of the complete Dorex installation to be less than one half our loss from just one batch of damaged plates."

If air pollution is your problem, count on Dorex to solve it. Why not get the full details on Dorex Air Recovery now? Write to the Connor Engineering Corporation, Dept. B-57, Danbury, Connecticut.

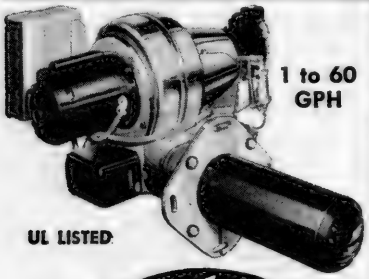


CONNOR ENGINEERING CORPORATION

dorex®

air recovery

LOOK AT THIS NEW
FORCED-DRAFT BURNER
THAT DELIVERS BIG
PERFORMANCE



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OIL
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flame
OIL

FOR COMMERCIAL
AND INDUSTRIAL
INSTALLATIONS

While this burner *looks* like a standard residential type, it is a *big* heavy-duty machine. Features include two-stage fire, built-in controls for pre-purge, post-purge, and high-low-off fire control with automatic air/fuel ratio settings, terminal strips for accessory wiring, and wide ranges of capacities.

FOR 20 TO 150 H.P. BOILERS
HIGH STACK NOT REQUIRED

SYNCRO/FLAME Pressure Burners are capable of firing efficiently into combustion chamber pressures of 3" of water or more, eliminating the need for high stacks or expensive forced draft equipment. *No ordinary burner can do this!* SYNCRO/FLAME Pressure Burners are available for oil, gas, or dual-fuel service.

DETAILS ON REQUEST
Write today for data sheets describing all features and giving full specifications.

MANUFACTURERS OF OIL AND GAS AND OIL/GAS BURNERS
SYNCHRONOUS FLAME, INC.
WALWORTH • WISCONSIN

NEW CATALOGS

(*Continued from page* 148)

Use the prepaid postcard on back page for securing your copies of catalogs described in this department.

GAS WATER HEATERS— Specification of 17 models of commercial gas water heaters are detailed in an 8-page combination catalog and self-mailer available from Ruud Mfg. Co., Kalamazoo, Mich. The catalog covers commercial units in the three use classifications of the American Gas Association, automatic storage gas water heaters, circulating tank gas water heaters, and instantaneous gas water heaters. Sizing tables show Btu input, hot water delivery at graduated temperature rises and installation space requirements.

Circle **Item 92** on Inquiry Card

THREE PUMP CATALOGS—Utility pumps, submersible pumps, and water system pumps are covered in three catalogs offered by Continental Pump Co., St. Louis, Mo., national representatives of Robbins & Myers, Inc., the manufacturer. Pictures and text explain operation of screw-like rotor in flexible rubber stator. Motor and gasoline-driven units are described together with complete dimensional and capacity data.

Circle **Item 93** on Inquiry Card

THREE BASIC PLASTIC PIPES — Crescent Plastic Inc., Evansville, Ind., announces the availability of a 16-page brochure on plastic pipe. This handbook covers the three basic types of pipe: flexible, semi-rigid, and rigid. The advantages, methods of installation, the many applications, as well as the points to consider in selecting the proper type of pipe for any particular job, are explained. Chemical resistance charts as well as flow and friction tables are included.

Circle **Item 94** on Inquiry Card

HYDRAULIC PILOT VALVE—A catalog sheet available from Atlas Valve Co., Newark, N. J., describes its No. 811 and No. 811R (reverse acting) spring loaded, diaphragm actuated hydraulic pilot valve, designed to provide accurate control of diaphragm valves that are used either as reducing or unloading valves. Sheet contains photographs, cutaway diagrams, valve features, and recommended applications and specification instructions.

Circle **Item 95** on Inquiry Card

CIRCULATING PUMPS—Its Magnaflow circulating pumps are described in a brochure available from The Corley Company, Inc., Plainville, Conn. Pumps' unique design, having only one moving part and magnetically-driven straight line flow is explained.

Circle **Item 96** on Inquiry Card

POLYPHASE INDUCTION MOTORS — Bulletin GEC-1420, 4 pages, published by General Electric Co., Schenectady, N. Y., contains application data on dripproof and enclosed polyphase induction motors, 1-5 hp; frames 182-215; 208, 220, 440, or 550 volts; 60 cycles. Publication includes charts showing single-speed ratings and frame sizes, typical speed-torque curve, starting torque values, and starting and full-load currents. Cutaway drawings point out construction features. Dimension data is also included.

Circle **Item 97** on Inquiry Card

DRAFT INDUCER BLOWERS — Master Fan Corp., Los Angeles, Calif., has announced completion of literature on its draft inducer blowers for boilers. Brochure describes several of the company's blowers designed for inducing drafts in boiler installations, eliminating the need for extensive chimney building. It carries a great deal of useful information on such installation as well as full data on sizes, specifications, and performance.

Circle **Item 98** on Inquiry Card

REGISTERS AND GRILLES—Catalog 57 on registers and grilles for air conditioning is available from Rock Island Register Co., Rock Island, Ill. Perimeter baseboard diffusers, heating-cooling floor diffusers and out-of-the-wall units, registers, intakes, return air grilles, and plaster frames are among those listed. Sizes, prices, and shipping weights included.

Circle **Item 99** on Inquiry Card

AEC RESEARCH REPORTS—AEC Research Reports Price List, a cumulative listing of more than 3,600 AEC reports in the collection of the Office of Technical Services, U. S. Dept. of Commerce, Washington, D. C., is available from the Office. Issued semi-annually, the next list will be available in August, 1957.

Circle **Item 100** on Inquiry Card

DAMPERS, LOUVERS, DIFFUSERS — Its line of air diffusers, louvres, dampers, volume controls, registers, grilles, including ceiling air diffusers for modular installations with all types of tile ceilings are covered briefly in a brochure available from Air-Factors, Inc., Monrovia, Calif. Six bulletins, dealing with each of its items in full detail, are listed.

Circle **Item 101** on Inquiry Card

CHIMNEYS, FLUES, HEARTHS—Home Is Where The Hearth Is, a brochure on proper design and construction for chimneys, flues and hearths, is published by the Clay Flue Lining Institute, Akron, Ohio. Illustrated, four-color folder offers information on the protective advantages of clay flue lining, which is written into most city and community building codes.

Circle **Item 102** on Inquiry Card

(*Concluded on page* 152)

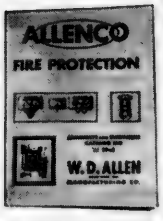
Interior Fire Protection involves more than most people see . . .

that's why Engineers and Contractors prefer

ALLENCO

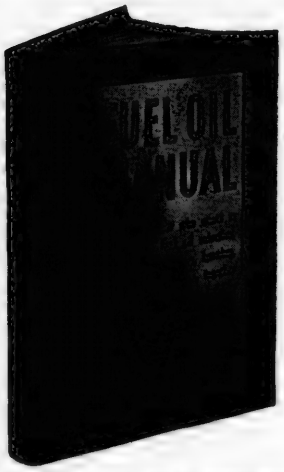
Flush-type Siamese—*one of many models*

This time-proved line *more* than meets specifications. It meets the highest standards of safety plus design, practicality and economy.



Write for Allen 150 (A.I.A. file 29e2) and nearby counsel . . .

W. D. ALLEN MFG. CO.
Room 700 Allenco Bldg. 566 W. Lake St. Chicago 6



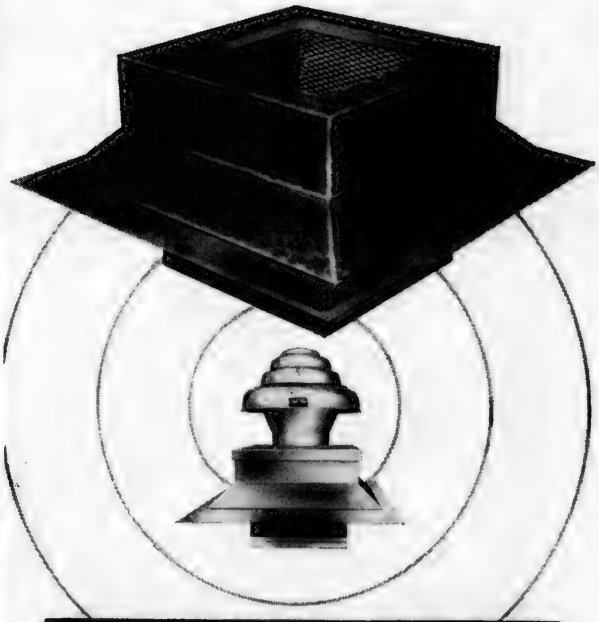
Here is a book that will give you a comprehensive picture of the characteristics and uses of every type and grade of fuel oil. The author explains the meaning of each oily property, and shows how this information is applied to the selection, handling and burning of fuel oil. Impurities and how they effect combustion are described fully, and a special chapter describes fuel oil additives and how they are used. Another chapter lists troubles which may be encountered in using fuel oils, and shows the correct remedy to apply in each case. Technical language is avoided wherever possible and all terms are fully explained.

160 Pages **$3.50** 34 Tables

In Canada or overseas, $4.20

THE INDUSTRIAL PRESS
93 Worth Street New York 13, N. Y.

NEW . . .
for sound reduction . . .



THE PENN VENTILATOR
SONOTROL
SOUND BARRIER
CURB

Noise reduction problems are prevalent in every industry. Penn contributes toward the minimizing of fan noises by its revolutionary new Sonotrol Curb. In effect, this device helps to reduce sound build-up at the source. Build-up is developed by any roof fan regardless of how expertly engineered or finely balanced.

Penn's Sonotrol Curb completes the roof ventilator specification. Curb construction on the job is no longer necessary now that this factory fabricated accessory is available.

Complete details are available in Bulletin DMX 18. For your free copy, write today.

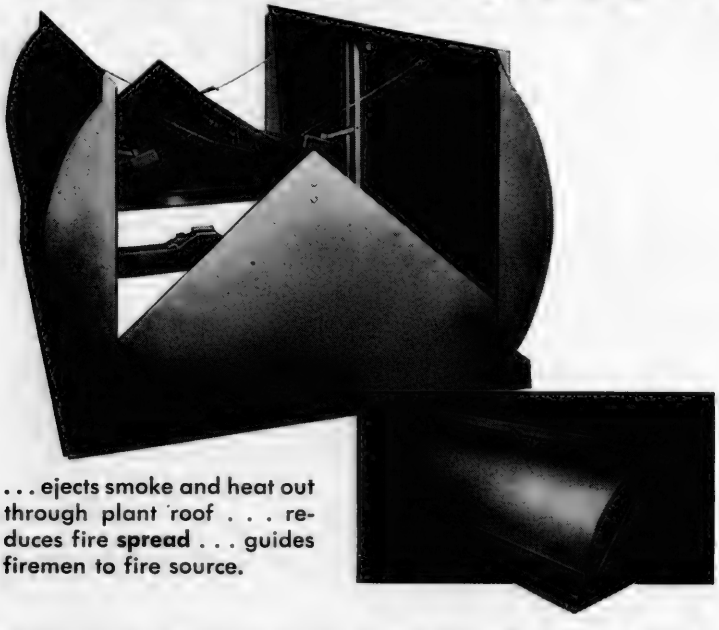
PENN VENTILATOR CO.
PHILADELPHIA 40, PENNA.
Representatives and Distributors in principal cities
Member of the Air Moving & Conditioning Association

RIGHT ON TOP . . . FOR MORE THAN 30 YEARS

Keep your fire loss Down

with the efficient new

Swartwout Pyrojector



. . . ejects smoke and heat out through plant roof . . . reduces fire spread . . . guides firemen to fire source.

Pyrojector is an effective answer to fires that billow up and spread under closed roofs. It opens a 28 square foot draft-fed escape vent for smoke and flames. Heat at 212° F. melts a fusible link — releases powerful spring force that opens dampers instantly.

This is a completely new design, with unusual features. Low contour (only 29" above curb), neat appearance. Installs and operates *entirely above roof level.* Spot it over most likely fire sources, singly or in groups. Or alternate with roof ventilators. Weatherproof when closed. Can be opened for extra ventilation in dry weather. Dampers are double wall construction, insulated. Release mechanism is rugged, positive.

For complete details of this new "escape" ventilation unit, write today for Form 701-H.

The Swartwout Company, 18511 Euclid Ave., Cleveland 12, Ohio

Swartwout ROOF VENTILATORS AND VENTILATING LOUVERS

ALSO AUTRONIC PROCESS CONTROL EQUIPMENT

NEW CATALOGS

(*Concluded from page* 150)

Use the prepaid postcard on back page for securing your copies of catalogs described in this department.

FLOAT VALVES—A 16-page technical bulletin, No. W-5, explaining the features of cushioned float valves is published by Golden - Anderson Valve Specialty Co., Pittsburgh, Pa. Valves maintain water level in elevated tanks, reservoirs, coagulating basins, and mixing chambers. They are designed for either cold or hot water service in either the quick opening or throttling design with integral or remote pilot control.

Circle **Item 103** on Inquiry Card

TEMPERATURE REGULATORS — A 12-page, two-color Bulletin S-7 describes Type S thermostatic temperature regulators manufactured by Lawler Automatic Controls, Inc., Mount Vernon, N. Y. These are self-contained, vapor-pressure-operated devices that automatically regulate the flow of liquid or steam through a valve. The bulletin describes the complete line of regulators in three variations and gives much engineering and technical data, plus capacity charts and installation information. Also illustrated in the bulletin is a wide selection of thermostatic bulbs for all regulator applications.

Circle **Item 104** on Inquiry Card

ALUMINUM COUPLERS AND FITTINGS—Its Royal 1000 line of aluminum couplers and fittings is described in Catalog TC-200 published by Gateway Tube and Coupler Corp, Chicago, Ill. Company's exclusive flaring method for thin-wall tubing is discussed. Physical properties of aluminum are summarized in a two-page table giving resistance to hundreds of compounds. Another section reviews the company's line of flaring tools.

Circle **Item 105** on Inquiry Card

OIL BURNERS, OIL HEATERS—Catalog Data Sheets 409-A and 709-B, describing low-pressure air type Series B oil burners for process and industrial heating, burning any grade of fuel oil; and electric oil heaters with automatic control of temperatures for heating heavy grades of fuel oil in fuel oil storage tanks, are available from Hauck Mfg. Co., Brooklyn, N. Y.

Circle **Item 106** on Inquiry Card

HOT WATER HEATING SPECIALTIES—Circulators, flow control, pressure relief, and pressure reducing valves, expansion tanks, air eliminators and vents, radiant heating headers, and electrical heating controls, are among the items covered in Catalog 2570 published by Triplex Heating Specialty Co., Inc., Peru, Ind. Its 16 pages are well illustrated and complete dimensional data are included.

Circle **Item 107** on Inquiry Card

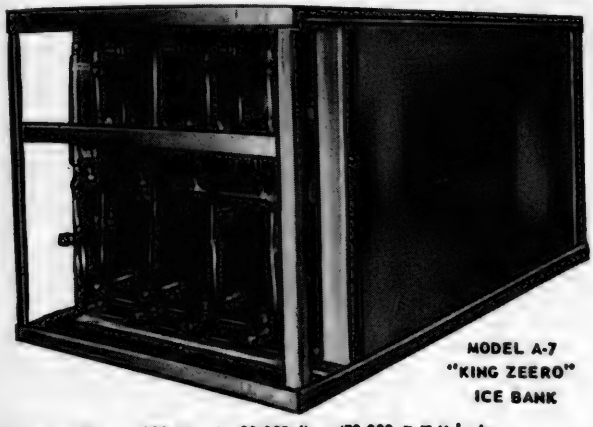
"King Zeero's" Sweet Water ICE BANKS offer ICE-CONCENTRATED Refrigeration for Air Conditioning

CONTINUOUS RIFLED GALVANIZED COILS
EXPANSION VALVE CONTROLLED

32°-34° ICE WATER COLD

DESIGNED FOR USE WITH:
FREON — METHYL CHLORIDE — AMMONIA

The "King Zeero" ICE BANK is designed for air cooling in Churches, Mortuaries, Theatres, Offices, Stores, Auditoriums, Factories, Clubs, Restaurants, etc. Ice Banks may be added to existing systems for increased capacity.



MODEL A-7
"KING ZEERO"
ICE BANK

CAPACITIES - 500 lbs. to 30,000 lbs. (72,000 B.T.U.'s to 4,320,000 B.T.U.'s) in a single unit. Multiple units may be installed.

The "King Zeero" ICE BANK is designed to deliver tons of 32 to 34 F. ice water for recirculation through air cooling coils. Peak loads many times compressor capacity are easily handled.

- DIRECTED COURSE OF WATER travels with "built-in" agitation.
- NO MECHANICAL AGITATION REQUIRED.
- LARGE WATER COMPARTMENTS spaced on 11" and 12" centers.
- 33% EXTRA ICE CAPACITY safely attained without freezing up.
- ICE IS "BURNED OFF" PLATE COILS progressively, exposing prime and secondary surface for maximum flash cooling capacity.
- ICE THICKNESS automatically controlled - eliminates "freeze ups."
- 94 SIZES to fit space requirements. Other designs for special applications.

MAIL COUPON TODAY

King Zeero Co., 4302 W. Montrose Ave., Chicago 41, Ill

☐ Please send me your new ICE BANK Catalog.

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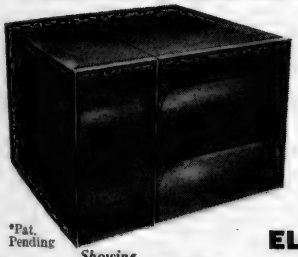
Address _____
City _____ State _____

THE KING ZEERO COMPANY
4300-14 W. Montrose Ave., Chicago 41, Ill

UNI-SILENCER*

THE NEW, MODULAR SILENCERS FOR AIR CONDITIONING and VENTILATING SYSTEMS



In single units or stacked to meet all your airflow requirements in low, medium and high velocities!

Write for FREE complete ENGINEERING MANUAL

*Pat. Pending

Showing
Half Unit, 12x24x32", Wt. 44 lbs.
Full Unit, 24x24x32", Wt. 69 lbs.

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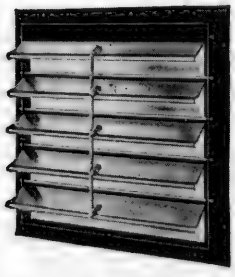
ACOUSTICAL DIVISION
711 Third Ave., Dept. AC, New York 17, N. Y.

Elgo Ventilating Specialties

Different Types of Shutters to Meet Every Ventilating Need

No matter what your ventilating problem may be, you will find the type of shutter you require among the 22 types of shutters and dampers in the Elgo line. Write for NEW 16-PAGE CATALOG.



"ELGO" TYPE
AUTOMATIC SHUTTER
Front View (Open)

Free CATALOG

ELGO SHUTTER & MANUFACTURING CO.
2738 W. Warren Detroit 8, Mich.

MASS PRODUCTION COSTS TOO HIGH?

Here's the ideal low-cost indicator for those hard-to-get-at places.

NEW "237"
LIQUID EYE
Positive Sealing Indicator

(Illustrated 3/8" M. FL. x 3/8" FE. FL.)

The new Allin "237" has all the proved Liquid Eye features plus:

- **smaller — more compact — dependable. (about 1/3'd smaller in the 3/8" male to female size than any previous unit).**
- **complete self-contained economy unit.**
- **new simplified design.**
- **available with 2 or 3 viewing ports.**

Custom units can be made to your exact specifications. Consult Allin engineers now.
Write today for full information and catalog covering complete Allin line.

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410 N. Hermitage Ave. • Chicago 22, Illinois
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DESIGN OF HEATING AND VENTILATING SYSTEMS

Includes 96 full-page charts to solve your problems of heating and ventilating involving load determination, duct design, panel heating, solar heating and combustion analysis. Opposite each chart is a design example and the solution illustrating the use of each method. The text clearly explains the engineering background and the mathematical basis of each chart.

320 Pages, 96 Charts, $7.00.
In Canada or overseas, $7.80.

DESIGN OF INDUSTRIAL EXHAUST SYSTEMS

How to design, build or buy an exhaust system that will function adequately and economically, and meet the requirements of law and industrial hygiene. Covers flow of fluids—hood forms—air flow through hoods—pipe resistance—piping design—dust separators—low pressure conveyors—centrifugal exhaust fans—structural details—field measurements and their interpretation.

252 Pages, 122 Illustrations, $3.50.
In Canada or overseas, $4.25.

EXHAUST HOODS

Practical hood design, including the latest principles of air handling, contaminant dilution and transport velocities. Includes design of hoods for control of dust, mist, fumes, vapors and gases with many particular references to processes such as bagging, drilling, screening, grinding, welding, plating and many others. Simple formulas and diagrams show exact procedures.

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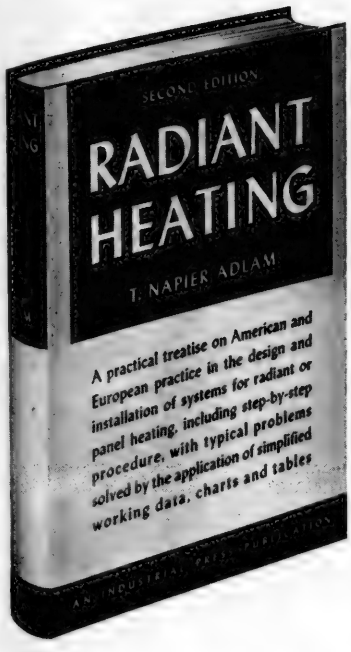
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T. NAPIER ADLAM
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The items appear in the same order as the advertisements to which they refer, to facilitate obtaining further information after reading an advertisement. NOTE: All advertisements are digested here except those received too late for inclusion. The Index of Advertisers lists all the advertisements in this issue.

Use the postcard below for catalogs, new equipment and materials, as well as Ad-Digest items.

PRESSURE REGULATORS
Pressure regulators for commercial, industrial, and institutional application are available from this manufacturer, as well as a line of pressure reducing valves. Two catalogs describing lines are available.
Inside front cover — Item 108

BONDED FAN RATINGS
Manufacturer's fan ratings are dependable to the extent that they are now bonded as to performance by the American Surety Company. Information is available.
Page 1 — Item 109

HOT WATER BASEBOARD HEATING
The company's forced hot water baseboard heating system is improved for 1957 and available at a new lower price. Cool air system, independent but compatible, is also available. Two bulletins are offered.
Page 2 — Item 110

LIQUID CHILLER
Manufacturer's liquid chiller uses piped-in brine for a compact, efficient, low-cost air conditioning system. Catalog is available.
Page 4 — Item 111

ALUMINUM INSULATION
Even in warm, closed rooms, drafts may be felt due to flow of warmth to cold by radiation and conduction. Multiple layers of aluminum insulation in wall space maintain comfort. Forty-eight-page manual is available.
Page 7 — Item 112

WROUGHT IRON PIPE
The structure and composition of the company's wrought iron pipe prevent pitting and penetration when corrosion strikes, and leads to long service life. Bulletin is available.
Page 9 — Item 113

FLUSH VALVES
Providing a future of faultless service for national headquarters of both Girl Scouts and Boy Scouts of America are this manufacturer's flush valves. Catalog is available.
Page 11 — Item 114

HEAT EXCHANGERS
The company's extended surface heat exchangers are the exclusive product, not a by-product, and provide high efficiency and long service life. Information is available.
Page 13 — Item 115

CIRCULATING PUMPS
These pumps used in hot water heating systems are silent, vibrationless in operation. Electric motor operates almost silently, yet has plenty of stamina to hold up under years of steady operation. Company's nearby engineer will help you select the motor to meet your specifications. Information available.
Page 14 — Item 116

PACKAGED COOLING TOWERS
When specifying these packaged cooling towers, customers receive a guarantee of performance and service for all air conditioning and refrigeration services. Information is available.
Page 15 — Item 117

BRONZE VALVES AND FITTINGS
Company's globe valve with renewable disc, gate valves, and globe valve with special seat and disc are illustrated. They are built to give dependable, trouble-free service on all recommended jobs. Specifications are given. Information available.
Page 16 — Item 118

GALVANIZED SHEETS
Manufacturer's zinc coated galvanized sheets are soft and ductile, easy to form, and are almost impossible to chip or flake regardless of severity of fabrication. Information is available.
Page 17 — Item 119

AIR FILTERS
Economical and light weight aluminum filters are available for residential, commercial or industrial applications. Ideal for new or existing installations, they reduce operating costs through longer service life and top performance. Information is available.
Page 18 — Item 120

EQUIPMENT FRANCHISE
Manufacturer has been in business for 103 years and through experience has learned how to maintain a mutually profitable relationship with franchise holders. Information on franchise is available.
Page 19 — Item 121

SUPERVISORY DATA CENTER
Ad presents another example of how the supervisory data center makes it easy for a store manager or maintenance superintendent to understand and effectively operate the air conditioning system. Information is available.
Pages 20-21 — Item 122

ELECTRONIC AIR CLEANERS
The company makes a complete range of electronic air cleaners for any type of air conditioning or ventilating system. Module construction makes installation and servicing easy. Details are available.
Page 22 — Item 123

UNIT VENTILATOR CONTROLS
This control team of room thermostat, air stream thermostat, valve, and damper motor, developed for unit ventilators, eliminates hot and cold blasts, and gives even, modulated air flow. Information is available.
Page 23 — Item 124

Circle numbers corresponding to the items and advertisements in which you are interested. Print your name and address clearly. Information will be sent directly from manufacturers.

INQUIRY CARD

Circle below item numbers on which you wish catalogs or further informatio

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Ad-Digest

SPACE HEATER
Company's counter flow space heater comes in a size and type for every heater application including space heating, process drying, and combination heating and air conditioning. Bulletin is available.
Pages 24-25 Item 125

ROLL TYPE AIR FILTER
There are no dust disposal problems with this roll type air filter. Dust is rolled away as the automatically renewing media moves down the face of the filter. Bulletin is available.
Pages 26-27 Item 126

PAPER AIR FILTER
Manufacturer's inexpensive paper air filter, when used in conjunction with permanent filters, gives air cleaning efficiency rivaling that of the most expensive equipment. Information is available.
Page 28 Item 127

VANAXIAL FANS
These vanaxial fans include lighter weight with rugged construction and cylindrical shape. They require less support than centrifugal fans of equivalent capacity. Information is available.
Page 29 Item 128

PRESSURE REDUCING VALVE
Manufacturer's pressure reducing valve for use in both high and low velocity air distribution systems is designed to incorporate air foil characteristics, permitting quiet handling of large pressure drops. Catalog is available.
Pages 30-31 Item 129

SEAMLESS PIPE
The manufacturer's seamless pipe in sizes from 4 to 16 inches O. D. was utilized in the heating and air conditioning system of new Texas National Bank Building. Information is available.
Page 32 Item 130

BACKWARD CURVE BLOWERS
Company controls entire production of these versatile blowers from drawing board to finished product. It is guaranteed unconditionally for quiet, trouble-free operation. Bulletins are available.
Page 34 Item 131

FINED COILS
Company has manufacturing facilities and production control which meet any demand for quality finned coils. Details are available.
Page 35 Item 132

EXPANSION JOINTS
Fewer joints per length of line are required by large steam distribution systems when this company's slip-type expansion joints are used. Made with traverses up to 12 in. single and 24 in. double, the joints may be packed under full steam pressure on the job. There is a lower pressure load on the end anchors. Bulletin is available.
Page 36 Item 133

MODERN COAL BURNING
The Trane Co., La Crosse, Wis., has found that burning coal the modern way results in lower overall cost of steam generation and readily available fuel supply. Additional case histories of modern coal burning installation are available.
Page 37 Item 134

ELECTRONIC AIR CLEANER SECTION
This electronic air cleaner section adapts to the manufacturer's unit air conditioning and ventilating systems making available single equipment responsibility. Information is available.
Pages 38-39 Item 135

PNEUMATIC CONTROL SYSTEM
Precision regulation of temperatures and humidities by means of manufacturer's pneumatic control system makes important contributions to production efficiency in the new air conditioned home of Hallmark cards. Information is available.
Pages 40-41 Item 136

AIR CONDITIONING EQUIPMENT
This heating and air conditioning equipment line, including fan coil units, unit heaters, duct furnaces and convectors, has high quality long recognized among building professionals and owners. Catalogs describing products in company's line are available.
Pages 42-43 Item 137

TEMPERATURE REGULATORS
There is no job too tough or too unique for the regulator manufactured by this company. One deg off, up or down, it is in operation, correcting to and maintaining the desired temperature. Information available.
Page 44 Item 138

INTEGRAL FURNACE BOILERS
Steam for brewing, pasteurizing, sterilizing and heating for Carling Brewing Company's Natick, Mass., plant is supplied by two of the manufacturer's integral-furnace boilers. Information is available.
Page 45 Item 139

PACKAGED AIR CONDITIONERS
Manufacturer features quiet of self-contained air conditioners. Modern compressor plus exclusive package design assures smooth vibration-free operation. Catalog is available.
Pages 46-47 Item 140

HEATING, AIR CONDITIONING LINE
This company's acquisition of a manufacturer of condensing units and compressors brings under one management the manufacture of well established lines of equipment for the air conditioning, refrigeration and heating industry. Information on equipment lines is available.
Page 48 Item 141

COLOR CODED COPPER TUBE
First to color code its straight lengths of copper water tube, the company again steps out in front by color coding its coiled copper water tube packages. Information is available.
Page 49 Item 142

CONDENSING UNITS
Manufacturer offers a complete line of open-type and semi-hermetic condensing units, in a wide range of sizes, to fit every refrigeration or air conditioning installation. Information is available.
Page 50 Item 143

CENTRIFUGAL ROOF VENTILATOR
Manufacturer's centrifugal power roof ventilator includes among its features variable pitch V-belt drive, low overall height, and inspection panel and complete accessibility. Bulletin is available.
Page 51 Item 144

DIRECT-DRIVEN PUMP
One of the big reasons why the manufacturer's direct-driven pump is specified as an integral part of so many air conditioning systems is its compact, rugged design and trouble free operation. Information is available.
Page 52 Item 145

LINE OF PUMPS
Manufacturer's complete line of pumps features compact, modern design with ready accessibility for inspection. They are built to every installation requirement, in single and duplex units. Brochures are available.
Page 53 Item 146

STEEL PIPE
Providing dependability and long life for Lamson & Sessions Co., Cleveland, Ohio, producers of industrial fasteners, will be tons of the manufacturer's quality steel pipe. Information is available.
Page 54 Item 147

SOUND TRAPS
Sound traps are made by this company to silence air conditioning noise of all frequencies in the audio-frequency range. A 7-ft unit suppresses as much sound as 100 ft of ordinary duct lining. Four series cover applications ranging from offices to recording studios. Booklet is available.
Page 55 Item 148

YEAR-ROUND AIR CONDITIONERS
Typical of the variations available in the manufacturer's year-round room air conditioner line are cabinet or recessed models, vertical or horizontal models, combination water cooling and heating coils, and combination direct expansion and steam coils. Catalog is available.
Page 56 Item 149

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BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 53, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

AIR CONDITIONING, HEATING AND VENTILATING
93 WORTH STREET
NEW YORK 13, N. Y.

AD-DIGEST SERVICE

Ad-Digest

REFRIGERATION UNIT
The manufacturer's refrigeration unit, utilizing hermetic, centrifugal compressors, are ideal for air conditioning, and for chilling water in industrial processes. Information is available.
Page 57 Item 150

MOTORS AND PUMPS
Manufacturer features unit responsibility, national network of distributors and warehouse stocks for fast, dependable delivery of motors and pumps for air conditioning installations. Information, name of nearest distributor are available.
Page 58 Item 151

HEATING AND VENTILATING UNIT
Manufacturer's equipment line now includes a heating and ventilating unit which contains all-purpose interchangeable components for make-up air and general ventilation applications. Bulletin is available.
Page 59 Item 152

AIR DISTRIBUTION GRILLES
The manufacturer's grilles, coupled with published data from the company's laboratory eliminate guesswork. Performance is guaranteed when used according to these data. Catalog is available.
Page 60 Item 153

COPPER AND BRASS TUBING
Manufacturer claims 90% of business comes from repeat customers and attributes it to highest standards of tolenance, temper and uniformity in manufacture of is copper and brass tubing. Information is available.
Page 61 Item 154

ZONE AIR CONDITIONING
Company's zone-by-zone air conditioning system is easy to install, operates economically, and minimizes space problems. A variety of units are obtainable. Information is available.
Page 62 Item 155

GATE VALVES
Gate valves are made by this company with bronze or nickel alloy wedges. Bronze gate valves are available with Monel seat rings for 200 and 300 psi. The line of valves offers different patterns. Information is available.
Page 63 Item 156

SELF-CONTAINED CONDITIONERS
Model illustrated has 7½ ton capacity, requires only water and power connections. For commercial and larger home air conditioning. Direct air discharge and intake eliminates need for ducts. Line starts with ¾ tons. Data available.
Page 121 Item 157

DUCTILE IRON PIPE FITTINGS
These ductile iron pipe fittings are recommended where structural strength is specified, where wide temperature fluctuations are present, and where rust and corrosion are problems. Catalog is available.
Page 121 Item 158

VENTILATING LOUVERS
Air removed from a building with gravity or fan ventilators must be replaced. This company's louvers with fixed air adjustable blades provide efficient weatherproof air inlets. Data book is available.
Page 123 Item 159

FORCED DRAFT COOLING TOWER
An efficient tower that combines the simplicity of natural draft towers with all the efficiency of a forced draft tower is available from this manufacturer to match air conditioners from 3 to 25 tons. Information is available.
Page 123 Item 160

Circle numbers corresponding to the items and advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

UNIT HEATERS
A complete line of unit heaters is offered including hot water and steam models as well as units designed to burn all gases. A full range of sizes is obtainable. Information is available.
Page 125 Item 161

POWER ROOF VENTILATORS
Right in step with the trend to modern plant design, the manufacturer's power roof ventilators provide economical and flexible industrial ventilation. Information on hood type and upblast type ventilators are available.
Page 127 Item 162

HEATING SYSTEM
The company's heating system makes a separate zone out of every room, assuring tenant satisfaction, fuel savings and economical installation. Booklet is available.
Page 129 Item 163

QUIET ROOF EXHAUSTERS
To minimize noise caused by vibration, the company developed this quiet-tested roof exhauster with its special cushion suspension. Forty-four per cent less vibration is transmitted. Catalog is available.
Page 131 Item 164

STRIP AIR DIFFUSERS
The strip air diffusers made by this company combine the features of both slots and air diffusers to provide equalized air flow throughout the entire length. The slot diffusers can be located in walls, ceilings, coves, moulds, window reveals, and stools. Catalog is available.
Page 136 Item 165

AIR CONDITIONING PRODUCTS
The company offers a complete line of air conditioning products which are designed, engineered and manufactured to work together. Information on line is available.
Page 137 Item 166

POWER EXHAUSTER
The world's most efficient power exhauster, for industry, institutions, or residences, has no motor, fan, or bearing in exhaust line; needs no stacks; and has acid-resisting vitrous enamel finish. Engineering data available.
Page 138 Item 167

HIGH VELOCITY AIR FILTERS
These filter media have special hemmed edges for strength and safe, easy handling. They have a maximum efficiency from 288 to 510 fpm. Low velocity and grease filters are also made. Catalogs available.
Page 139 Item 168

REFRIGERATING EQUIPMENT
Nine of this company's compressors carry the air conditioning load, divided into three systems, for the first completely air-conditioned large hotel in the North, the Claypool at Indianapolis. Ice-making and quick freezing equipment also offered. Information available.
Page 139 Item 169

RADIANT-ACOUSTICAL CEILING
Economy is now possible with this integrated radiant acoustical ceiling. All radiant duct, aluminum acoustical panels, diffuser panels and framing for recessed fixtures are supplied. Booklet available.
Pge 140 Item 170

POWER BOILERS
Company has been a leader in boiler design and construction for 93 years. Dependable, efficient, modern power boilers satisfy increasing demands of institutional, apartment, office and industrial buildings. Information available.
Page 141 Item 171

INQUIRY CARD

Circle below item numbers on which you wish catalogs or further information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
45	46	47	48	49	50	51	52	53	54	55	55-A	56	57	58	59	60	61	62	63	64
66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
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108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128
130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172
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Ad-Digest

PRODUCT COOLERS
Product coolers are available for any given temperature needs, for both wet and dry operation. Water and hot gas defrost can be furnished in addition to custom engineered units. Catalog is available.
Page 141 Item 172

COOLING TOWERS
A chemical company supplements its 1936 installation with a second cooling tower made by this company. A complete line of mechanical and natural draft cooling towers is offered by the company. Its engineers will assist customers in selecting the correct tower. Information is available.
Page 142 Item 173

ALUMINUM GRILLE
Manufacturer offers a new extruded all-aluminum grille which blends perfectly with contemporary interior designs. Grille provides maximum free area with minimum weight. Information is available.
Page 143 Item 174

FLEXIBLE DUCT CONNECTORS
Flexible duct connectors are made by this company in one-piece, factory-assembled, metal-to-material units that unroll flat. A choice of canvas, asbestos, or neoprene-coated fiber glass is offered attached to galvanized steel or aluminum in 25, 50, or 100-ft rolls. Catalog and specification sheet are available.
Page 143 Item 175

PORTABLE PYROMETER
A wide selection of thermocouples and extension arms assures adaptation to your needs of this portable pyrometer. Eight scaled ranges are available up to 2000 deg F. Bulletin is available.
Page 145 Item 176

HUMIDITY CONTROL
The manufacturer's method of humidity control provides more effective air conditioning because cooling and heating functions are made separate from adding or taking away of moisture. Two bulletins which describe system are available.
Page 145 Item 177

FILTER ENGINEERING
For any air conditioning and ventilating equipment, engine, or compressor application using air or liquids, there is a filter engineered by this company to solve each filter problem. Catalog is available.
Page 146 Item 178

DIFFERENTIAL PRESSURE CONTROL
This control incorporates two pressure chambers separated by a sensitive diaphragm. Change in relationship of the two pressures operates control. Bulletin is available.
Page 146 Item 179

BOILER WATER LEVEL CONTROL
Manufacturer believes their boiler water level control to be the safest as well as the simplest device available. Operating life is almost unlimited. Catalog is available.
Page 147 Item 180

ACTIVATED CARBON FILTERS
Company doing metal photo sensitizing process was troubled by sulphide gases from nearby industrial plants. The manufacturer's activated carbon filters cleared air and reduced process spoilage. Details are available.
Page 149 Item 181

PUMP LINE
Manufacturer has pumps for every application including coolant circulation, liquid transfer, sumps, septic tanks, water supply and many others. Information on complete line is available.
Page 149 Item 182

PRESSURE BURNER
This company's burner looks like a residential type but is a heavy duty machine firing efficiently into combustion chamber pressures of 3 in. or more. Fuel is oil, gas, or both. Data sheets are available.
Page 150 Item 183

INTERIOR FIRE PROTECTION
Manufacturer's interior fire protection line more than meets specifications. It also meets the highest standards of safety plus design, practicality and economy. Bulletin is available.
Page 151 Item 184

VENTILATOR CURB
Noise reduction problems are present in every industry. The manufacturer contributes towards the minimizing of sound and noises by its new ventilator curb. Bulletin is available.
Page 151 Item 185

FIRE ESCAPE VENT
Company's product is an effective answer to fires that billow up and spread under closed roofs. When heat melts a fusible link, a 28 sq ft vent for smoke and flames is opened. Bulletin is available.
Page 152 Item 186

ICE BANKS
Sweet water ice banks are designed by this manufacturer to deliver tons of 32 to 34-deg F ice water for recirculation through air cooling coils in air conditioning systems. Designed for use with Freon, methyl chloride, or ammonia, the banks may be added to existing systems for increased capacity. Catalog is available.
Page 153 Item 187

POSITIVE SEALING INDICATOR
The ideal low-cost indicator for hard-to-get-at places, new liquid eye positive sealing indicator is more compact, completely self-contained, available with 2 or 3 viewing ports. Catalog available.
Page 153 Item 188

AIR FLOW SILENCER
Ad describes a new, modular silencer for air conditioning and ventilating systems. Device comes in single units or stacked to meet all air flow requirements. Engineering manual is available.
Page 153 Item 189

AUTOMATIC SHUTTER
Manufacturer's automatic shutter is unusually sensitive to air current causing the aluminum louvers to open instantly when fan is turned on and snap shut when fan is turned off. Information is available.
Page 153 Item 190

DESIGNERS WANTED
Many opportunities for men who want to grow in engineering through broader assignments are outlined in advertisement. Whether mechanical, steam power, or heating and ventilating is your field, company urges you to send complete résumé.
Page 155 Item 191

RELIEF VALVES
The extra capacity, extra safety, and assurance of positive protection makes the manufacturer's relief valves the choice of engineers and contractors. Data sheets are available.
Inside back cover Item 192

BOILER WATER LEVEL CONTROLS
Ad shows simple hookup required to utilize manufacturer's water level and feed pump controls for medium pressure boilers. Installation and wiring diagrams are available.
Back cover Item 193

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NEW YORK 13, N. Y.

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YOU CAN HAVE CONFIDENCE IN

HENRY
RELIEF VALVES

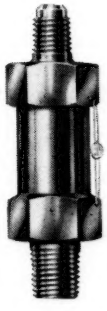
The extra capacity, the extra safety, the assurance of positive protection make Henry the choice of engineers and contractors. All Henry Relief Valves in the sizes and types listed below are constructed in accordance with the standards of the ASME. In addition these valves are stamped NB to indicate National Board Certification as to capacities.

UV ASME NB National Board Certified

FOR FREON AND SIMILAR REFRIGERANTS

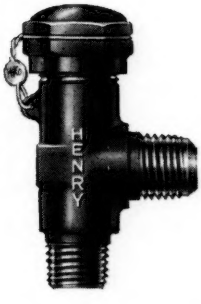
TYPE 523 STRAIGHT-THROUGH RELIEF VALVE

Valve has Henry "Controlled Cushion" cup seat disc construction which prevents deformation of sealing ring and assures consistent operation. This design provides positive relief at predetermined set pressures. Brass construction. Sizes (inlet x outlet) ½" MPT x ⅝" Flare; ½" FPT x ½" FPT; ¾" FPT x ¾" FPT; and 1" FPT x 1" FPT.



TYPE 52 ANGLE RELIEF VALVE

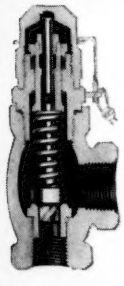
This forged brass relief valve is available in sizes (bottom inlet x side outlet) ¼" MPT x ⅜" Flare; ⅜" MPT x ⅜" Flare; ⅜" MPT x ½" Flare; ½" MPT x ⅝" Flare; and ⅝" ODS x ⅝" ODS.



TYPE 522 ATMOSPHERIC RELIEF VALVE

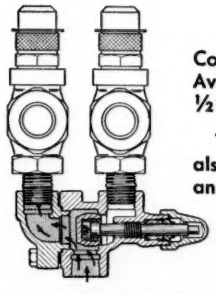
This relief valve of brass construction is for small Freon units and does not have an outlet line connection. Available with ⅛" MPT or ¼" MPT inlet connection.

FOR AMMONIA



ANGLE RELIEF VALVE

Valve has a soft metal alloy seat. Manual reseating stem permits positive emergency reseating without removing the valve from the line. Stainless steel seat insert, seat disc and main guides. Sizes (inlet x outlet) ½" FPT x ¾" FPT; ¾" FPT x 1" FPT; 1" FPT x 1¼" FPT; and 1¼" FPT x 1½" FPT.



PACKAGED DUAL RELIEF VALVE ASSEMBLY

Complies with ASME Code Requirements. Available with F.P.T. inlet connection sizes, ½", ¾" and 1".

Three-way dual shut-off valves are also available separately in various types and sizes for both Ammonia and Freon.

Packaged Assembly Simplifies Field Installation

Pressure Relief Setting Range of Henry Relief Valves, 50 to 350 PSI

WRITE FOR DATA SHEETS:

AE1303-1
Capacity ratings of Henry Relief Valves

CMC-3
A guide to the selection of Relief Devices in accordance with Chicago Municipal Code

B6-1
Henry Dual Ammonia Relief Valve Assemblies

See your Henry wholesaler for these certified relief valves.

HENRY VALVE COMPANY

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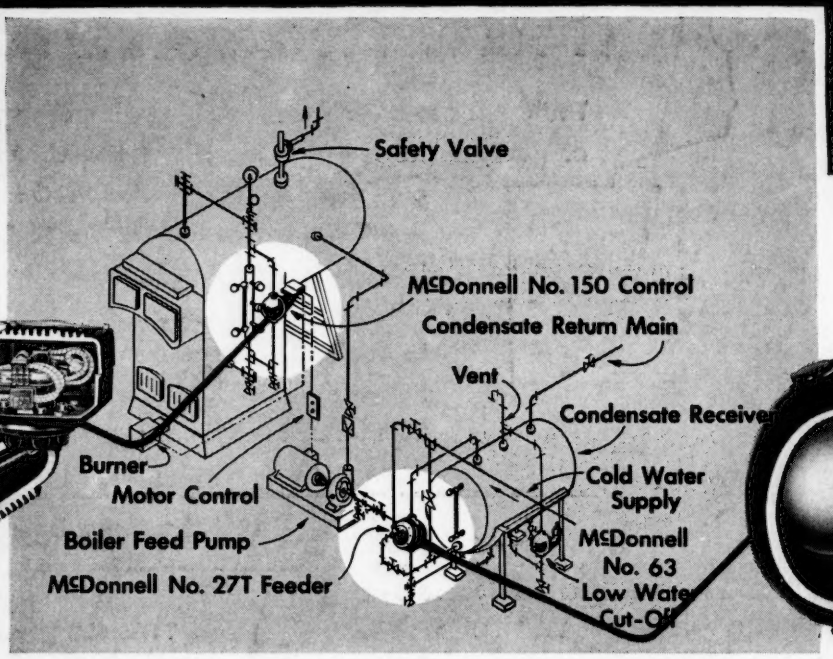
SPECIALIZED MANUFACTURERS OF THE COMPLETE LINE OF RELIEF VALVES FOR REFRIGERATION AND AIR CONDITIONING

Here's the GREAT COMBINATION for those Medium Pressure Boilers

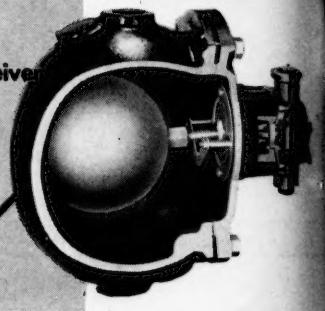
M-DONNELL

No. 150
PUMP CONTROL



M-DONNELL

No. 27T
MAKE-UP FEEDER



Pump Control, Low-Water Fuel Cut-off and Low Water Alarm

The No. 150 has two mercury switches. One provides a circuit for starting and stopping feed pump; the other has circuits for low-water cut-off of the burner and for low-water alarm bell if desired. Underwriters' listed.

It is built throughout to stand up under pressure and temperature encountered in boilers of any type or size; maximum steam pressure, 150 lbs. It has no stuffing boxes to cause trouble. Packless construction is provided by extra-heavy monel sylphon bellows. Switch leads have heat-impervious, porcelain-bead insulation. Mechanism is sealed to guard against tampering. Thousands of installations attest the dependability of this control.

How to use them . . .

This is the team of thoroughbreds that takes all the worries and troubles out of water level and feed pump control for medium pressure boilers—boilers with steam pressures up to 150 psi.

The drawing above shows the simple hook-up. The No. 150 controls the boiler feed pump directly from the boiler water level. This holds the boiler water level within close limits that assures maximum steaming efficiency and fuel economy. Any deficiency in the returns is at once replaced by the No. 27T Make-up Water Feeder on the receiver.

An extra switch on the No. 150 provides circuits for cutting off burner and sounding low water alarm in the event of some emergency such as current interruption in the pump circuit or failure of make-up water supply.

Yes, this set-up gives you close control of the water level and maximum protection from low water. Ask for simple installation and wiring diagrams.

Float-operated make-up water feeder for receiving tanks

The No. 27T is particularly suited for the task of maintaining the minimum water level required in condensate receiving tanks.

With a large water feeding capacity, it is capable of meeting any sudden demands of make-up water required by the boiler and the process system. The ample capacity further allows the No. 27T to be mounted at a relatively low point on the receiving tank. This provides adequate space for the return condensate, and prevents wasteful overflow. Its sturdy design and rugged construction enables it to withstand the unusually turbulent conditions often prevalent in the receiving tank. For tank pressures to 35 lbs., water supply pressures to 100 lbs. Other McDonnell Make-up Feeders, including flange-mounted types, available for almost all needs.

McDONNELL & MILLER, *Inc.*, 3500 N. Spaulding Ave., Chicago 18, Ill.

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